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Institute for Transport Studies

ITS Working Paper 581

November 2004

**A Review of factors which influence pedestrian use of
the streets: Task 1 report for an EPSRC funded project
on Measuring Pedestrian Accessibility**

FC Hodgson, M Page and MR Tight


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**A review of factors which influence pedestrian use of the streets:
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4. Introduction and objectives

This document was written to report the results from Task 1 of the Measuring Pedestrian Accessibility project funded through the EPSRC Future Integrated Transport programme. The project is being carried out by staff at the Institute for Transport Studies (ITS) at the University of Leeds in collaboration with the Pedestrians Association and City of York Council.

The overall aim of this project is to identify ways to encourage and enable more people to make more journeys on foot. The specific objectives are to:

- quantify attitudes and perceptions held towards walking and the barriers to walking;
- study the feasibility of developing a tool that can be used to evaluate pedestrian routes;
- undertake validation of the tool.

The achievement of these objectives will represent a thorough investigation into the two sides of providing for walking - the physical environment for pedestrians and people's attitudes to walking.

Task 1 of the project is an extended literature review and survey of experts to identify an initial list of features that are thought to influence pedestrian use of the streets.

The paper that follows is split into a number of sections which look at the different characteristics of pedestrians, factors which affect route choice, factors which affect mode choice, problems faced by pedestrians on our streets and a short review of recent Government (local and national) policy which has influenced pedestrian provision.

5. Review sources

The literature has been taken from a variety of sources: academic journals, lobby groups and government. The academic literature has come from a variety of disciplines including: architecture, environmental psychology, behavioural psychology, city planning, transport planning, geography and sociology. Government and lobby group sources usually aim to provide tools or guidelines for developing and implementing pedestrian friendly infrastructure and environments, thus in this literature it is more usual that the factors that influence walking journeys are referred to as barriers.

The literature has mainly been confined to the UK, but also includes some relevant work from the EU and the USA. It has also concentrated on the influential factors for walking in urban rather than rural environments and it may well be that different factors are important in rural settings or that the influential factors in urban environments carry different levels of importance in rural settings.

A word of caution, the literature in the review in the main comes from the transport field and is particularly focussed on policy issues, an implication of this is that the factors that have been researched or studied in some other way are generally those that are identified as having a negative impact on walking. Some factors, particularly those positive factors associated with walking are missing from the literature. For similar reasons the bulk of the factors identified in the literature relate to aspects of the built environment rather than an exploration of the effects of culture on walking. Each category is introduced in the remainder of this section.

6. Pedestrian Characteristics

In much of the literature there is the recognition that pedestrians are not, and should not, be treated as a homogenous group. The criteria used to categorise different types of pedestrian are not always consistent between the studies. In most there is recognition that physical ability, social roles and economic constraints play a part in the experience of being a pedestrian.

Pedestrians with a physical impairment, such as walking, breathing or sight difficulties are often given as a group who have particular needs in the pedestrian and urban environment. Age is often used as another criteria. Both the elderly and the young are often mentioned as particular types of pedestrian with different needs and interests. It should be noted that the reasons given as to why age is important are because age might have an impact on physical ability and cognitive skills as well as perceptions and feelings about the road environment and its safety and in addition relate to the social roles as dependents that the young and the elderly are expected to assume. There are also those users that are encumbered by shopping or pushing prams (Forward 1998). Further, those pedestrians that are travelling as a group composed of adults and children are often thought to have different needs and interests. Gender is another criterion for categorising pedestrians. There is some evidence that male and female pedestrians have different perceptions, needs and interests, Sharples and Fletcher (2000) for example, claim that the empirical work they conducted with regard to crossing facilities shows that valuations of different crossing facilities vary by age and gender. Intuitively this finding has some degree of truth as the needs and interests of male and female pedestrians vary just as their societal roles of men and women vary, for example more women than men work part-time and carry shopping and use buses. There is also evidence that people from poor or excluded backgrounds are more likely to walk than those from wealthier backgrounds, particularly if the household does not have access to a car (Living Streets, 2001). In addition studies have found that children from low-income backgrounds are more likely to experience higher levels of exposure to the road environment and a higher incidence of accident involvement (see Living Streets, 2001, Bly, Dix and Stephenson, 1999). Furthermore it is believed that ethnicity may also impact on walking needs and patterns although there is little research in this area.

7. Factors influencing route choice

7.1 Introduction

There are many papers on the pedestrian environment. There are few recent ones that focus on route choice, however, there are a number of policy documents that explicitly identify factors that are believed to act as barriers and obstacles to walking.

7.2 Interaction and categories

The experience of walking means that the individual is in interaction with the environment and with other users. Obviously these interactions are related, but for the purposes of this review they will be treated as distinct and the inter-linkages will be looked at separately. The review of the literature on pedestrians has identified four sub-categories relating to the interaction with the environment: pedestrian network; pedestrian environment; infrastructure provision and its management; land use and urban form. There are two sub-categories of

interaction with others and they are: interaction with other pedestrians (and particularly personal security) and interaction with traffic (see table 1).

7.3 Categories and factors

Within each of the categories the review has identified a factor or attribute of the built environment that influences route choice. In table 1 these factors or attributes have been categorised to ensure that they are unique to a particular sub-category. To date a total of 40 or so attributes or factors have been identified from the literature. The pedestrian environment category has a total of 21 but this figure increases if the different types of crossing facility are fully disaggregated. Other categories such as urban form and land-use, have not been as well researched which may account for why they have the least amount of detailed attributes. Table 1 shows all the factors identified in the review of literature that may influence route choice.

Table 1 Factors influencing routes by category and interaction

Interaction	Factor category	Factor detail
Pedestrian Interaction with environment	Pedestrian environment	Surface evenness, Tactile signals Footpath width Gradient Ramps steps Handrails; Guard rails Street furniture (Obstructions)? Benches; Meeting points; Toilets Carriageway width and no of lanes Crossing placement Crossing distance removed from traffic Crossing types: At grade pedestrian: Puffin ¹ , Zebra, Pelican, Toucan, traffic signal with ped phase, Crossing types: At grade traffic: Traffic signal without ped phase, (cycle phase etc), Crossing types: At grade: unsignalised, Crossing types: different grade pedestrian subway, bridge Drainage/puddles, car splashing Cleanliness: Litter, Dog fouling, Graffiti
	Pedestrian network	Connectivity Desire lines
	Urban form	Building blanks and back walls, Functionality Legibility Sense of place Scale: human or otherwise Car dominance
	Land use	Location of services, Mazes and street layout and distances
Pedestrian interaction with other traffic system users	Traffic	Volume, speed, composition, headlights, Fear, anxiety, intimidation, danger Traffic accelerating to 'beat' lights
	Personal security	Other users Intimidating behaviour/drunks

¹ Sharples and Fletcher (2000) found that there is some confusion among users; they are unable to differentiate between the signalised facilities

7.3.1 Pedestrian environment: infrastructure and management.

The pedestrian environment refers to the infrastructure, the geometric layout and the management of the transport system with particular respect to the provision for pedestrians, for example, footpath width or the unevenness of the surface and the crossing facilities. There are many important factors and all of them add to the ability of pedestrians to use the provision. Disabled Rights groups in particular have argued that it is important to take the very detailed characteristics of the pedestrian environment seriously in order to understand pedestrian route choices. What can seem to be a relatively minor factor in the pedestrian environment, such as pavement cracking, can actually cause people with a physical or visual impairment a lot of extra effort and trouble to surmount. One factor within this category that may at first seem unusual is toilets. There is an argument that toilets should be included as a factor of the pedestrian environment. For some people, particularly elderly pedestrians, women and those with young children toilet location is taken into consideration when deciding on routes (Living Streets, 2001).

7.3.2 Traffic.

Pedestrians interact with two groups using the transport system: other pedestrians and traffic, that is, car users. A number of characteristics relating to the interaction and presence of traffic have been identified in the literature including the volume, the speed and the composition of the traffic flow. The speed and composition of the traffic flow are more recent additions for example, the work of Appleyard and Lintell (1972) on vehicle volume did not include vehicle speed. In addition the recent guidelines on planning for pedestrian journeys (IHT 2000) identified 'aggressive' headlights as another possible factor in choosing a route to walk although this particular attribute has not been quoted in other work reporting empirical results. An additional aspect of traffic and pedestrian interaction identified in an American checklist for the walking ease of a neighbourhood was the acceleration of traffic towards traffic signals in order to 'beat the lights'. The incidence of traffic trying to 'beat the lights' was thought to cause unease among pedestrians. Similar concerns are raised in the UK about using zebra crossings as reported in Sharples and Fletcher (2000). In this work zebra crossing users expressed uncertainty about the behaviour of the oncoming traffic, particularly whether the traffic would slow down for the pedestrian, and this made using the crossing facility less comfortable. Other aspects of vehicle and pedestrian interaction, such as traffic giving way when turning into a minor road have not been found in the literature. Another aspect of traffic is parking, specifically people using pedestrian facilities to park their vehicles – it is already known from lobby groups such as the Pedestrians Association and Disabled Rights lobby groups that parking on footpaths and impeding pedestrian movement is considered to be an impediment and nuisance (Living Streets, 2001).

7.3.3 Pedestrian network.

Studies have shown that there are two factors concerned with the network of the footpaths that influence route choice, the first is whether the footpath is part of a network providing good connections and access to services and the other is whether the facility (footpath or crossing etc) is implemented according to the desire lines of pedestrians. These two are interrelated although direct and shortest time should not be confused. There is some agreement among the studies that pedestrians choose the straightest path and that the time taken to reach a particular destination is part of the calculation, for route choice. The time taken could well be the single most important factor in determining a route, but this is not really reported in the studies in the literature, and it is probable that this varies according to person type and journey purpose. Sharples and Fletcher (2000) found in their study that in

those locations where a crossing facility was not on the desire line pedestrians chose not to use it.

7.3.4 Urban form.

Urban form is a complex concept that is little understood in transport but refers to the morphology of the built environment and land use. Pedestrian networks are clearly related to urban form, though for the purposes of this review they will be treated separately. The urban form can be an attractive one to pedestrians or one in which the pedestrian feels ill at ease or out of place and is unattractive. In the literature a number of factors are cited as influencing urban form and pedestrian route choices. Most of the work on urban form comes from the discipline of architecture and they are often concerned with activity in public spaces, particularly leisure activities. There is an argument that the more use there is of urban public space the more walking journeys can be encouraged.

7.3.5 Car dominance and urban form.

Urban forms that are dominated by the car is given as a factor in some studies in particular the DETR (2000) cited it as a strategic factor in choosing routes and also to walk. But it is difficult from the studies to say exactly what is meant by 'car dominance' particularly as there are so few studies that have actually investigated this factor. It is possible that it means both the actual quantity of land given over to car traffic and also the priority that it is given e.g., traffic signals settings which prioritise the car traffic rather than the pedestrian, but it could also refer to the extent to which cities and urban form are built around and to accommodate the car. Car dominance and the scale of the built environment are obviously interrelated.

7.3.6 Human scale and urban form.

'Human scale' refers to the scale of the built environment in relation to human use of that environment. Frequently in cities, the provision of a particular type of road network (for example, the Leeds inner city motorway) and the scale of the buildings means that the built environment operates and is designed at a scale for a machine that travels faster and is larger than one single person. Human scale as well as being interrelated to car dominance is also obviously related to land use - think for example of the suburban sprawl noticeable at the edges of some cities in the UK and particularly in America. Obviously car travel and dominance are just one factor in influencing the scale of the urban form - there may be other more influential ones, for example, the desire to build bigger or to make a grandiose statement.

7.3.7 Legibility, functionality, sense of place and urban form.

Legibility, functionality and sense of place all refer to the individual pedestrian being able to make sense of the urban environment and feel welcome to use it. How it impacts on route choice is little understood. It is believed that pedestrians will not enjoy or come to avoid those areas that they do not feel comfortable in.

7.3.8 Land use.

Land use is thought to affect route choice in that the location of services impact on where pedestrians actually walk. In addition there are some street layouts that also impact on pedestrian route choice, for example, housing estates incorporating a maze of roads in their design and thus increasing distances travelled. In addition evidence is frequently presented that the trends in land use patterns mean greater distances to travel to access services thus affecting both mode choice and route choice. Land use, urban morphology and pedestrian

networks are all inter-linked (Living Streets, 2001; Hillman, 1999; Walk21, 2000; Adams, 2001).

7.3.9 Personal security.

As well as traffic pedestrians have to interact with each other when using the transport system. There has been quite a lot of work on personal security and walking. Certain behaviours have been identified as making people feel unsafe in particular the presence or absence of other people and particular types of people. Studies have found that women and men often feel unsafe if there are groups of men in the vicinity but women also feel unsafe if there are solitary men around (Crime Concern, 1997). Certain public spaces are associated with certain types of people and specific behaviours, for example, the centre of towns and the public transport system (stations, bus shelters) later in the evening are associated with drunken groups of young men and both men and women find these intimidating and plan routes to avoid those situations. Greater feelings of safety are associated with familiar places, which can also have an impact on route choice. Studies have identified that people use both their knowledge and perceptions as well as visual cues to decide if a place is safe or not. Graffiti in particular can make people feel unsafe as well as the amount of litter and the level of neglect. The level of street lighting is cited in most studies as an important factor in determining route choice for pedestrians at night. People have expressed fears about their personal safety when walking and take care to avoid places that they think are more dangerous than others. This is usually associated with desolate, poorly lit areas, and dark spots where assailants may lurk and areas where the pedestrian can feel confined such as subways. Personal security is one factor that could appear in both the category of personal security and the category of the pedestrian environment.

7.3.10 Familiarity.

Familiarity clearly influences route choice to a degree, but it is largely missing from the literature. It could be argued that it is not included because it is a factor to do with the individual and not to do with the provision and for this reason it could be left out of the table of factors (table 1). Familiarity can be thought of in two ways: firstly familiarity resulting from regular exposure to a route and secondly in the sense that the layout and urban form has a legibility about it, that is one may not have been there before but the sense of place is one that is recognisable and the individual elements and their relative position is familiar. Arguably the second of these is included in Table 1 as part of the category of factors to do with urban form. Another aspect of familiarity that may influence route choice is that of being able to predict the characteristics of the flow of traffic and the level of confidence that the pedestrian has in that set of expectations. This is closely related to familiarity but does not depend on being familiar with a particular spatial area, although is probably related to layout and urban form. There could be some circumstances whereby it is an unfamiliar area in the sense that the person had not been there before but found the traffic behaviour within the scene familiar, they could recognise a familiar narrative or pattern of behaviour within an unfamiliar setting.

7.4 Positive factors, attractors, facilitators.

There are a number of factors that are not particularly well represented in the literature, namely those associated with attracting people to particular routes. For example, the presence of others and their behaviour has been mainly researched in terms of what kind of behaviour deters people from a particular route, but there is less work on how and what kind of behaviour attracts people to use particular routes.

7.5 Single, cumulative and combined effects

Existing studies have considered and tried to estimate the impact of factors singly (Sharples and Fletcher, 2000) but there is little evidence that they have considered the cumulative effects of factors or the combined effects. It would seem reasonable to question whether factors assume different levels of influence, or retain the same level of influence, when combined. In addition there is little work on the cumulative effects of factors. Common sense would suggest that prior experience, that is, what has gone before during a walk journey, could have an impact on the influence of future factors, that is, what comes after. To put it another way, can there be a situation in which a minor factor assumes greater or lesser importance because it is one in a long line of factors experienced on that journey. Further work is required to establish the length of time over which to estimate such cumulative effects.

7.6 Symmetrical effects

If a factor is considered to be a barrier then it may be the case that its removal would facilitate walking. However, little work has been done to establish if this is indeed the case.

7.7 Relative importance of factors

The factors mentioned in the literature form a wide variety of attributes: ranging from infrastructure features to other users (both pedestrians and car drivers). It is difficult from the literature to get a sense of which are the most important in determining route choice. It would seem that importance can vary between different characteristics of pedestrian and also what combination or cumulative effects they might have. A further problem is variation in the empirically based literature included in this review. No two studies asked about the same factors, or all of the factors identified here nor did they ask about them in the same way. For example, Sharples and Fletcher (2000) asked respondents to rate 4 factors in terms of importance, but the factors were determined *a priori* which means that we do not know if other factors were more important to those pedestrians at that time.

It would be easy to slip into a ranking system for the factors that classifies some as important for pedestrian comfort and others as important for route or mode choice. However, such a ranking system would have to ignore the obvious impact that pedestrian comfort can have on mode and route choices. Thus it is difficult to classify one factor as only influencing pedestrian comfort when that comfort has an impact on route or mode choice.

8. Pedestrian mode choice

8.1 Introduction

There are two main studies investigating the walking decision, both are comparative studies investigating mode choice between walk, cycle or drive for all short trips (Forward 1998, Mackett 2001). For those with a car available the decision to walk was made in the context of having the option to drive. This review will identify those factors that attract people to walking rather than the various merits and demerits of car travel. A range of other studies not directly concerned but of relevance to mode choice have been included, for example, the study of school journeys by Bradshaw and Jones (2000) and the study by Stradling (2000) on using interchanges.

The factors that have been found to be important in deciding to walk are individual's assessments, attitudes and perceptions of: distance to destination and time taken; perceptions of time; personal security; traffic; urban form; the pedestrian environment; effort required [comfort]; and the weather. Each of these factors will be dealt with in turn in this section.

8.2 Distance

8.2.1 Distance or journey time.

The distance or time required for the journey is a factor referred to in all studies (IHT, 2000; Bradshaw and Jones, 2000; Mackett, 2001; Forward, 1998; Goodman, 2001; Partnership for a Walkable America; Hillman, 1999) in a variety of different ways, such as, saving time, the straightest line, time taken, or delay, but all report some concept of time involved in the decision making process and report it as a key determining factor. In addition studies of attitudes (Forward 1998; Stradling 2000; Hodgson and Tight 1999) report 'convenience' which would appear to be often related to and confused with time taken and delay experienced. In a study of mode choice for short trips (Forward 1998) travel time was identified as a factor in the decision to walk and if the individuals believed themselves to be 'in a hurry' they were less likely to make a walking trip².

8.2.2 Ever-increasing distances.

Distances and journey times are not so straightforward. They are not always the same thing although they are used interchangeably to mean the shortest time. In addition as was shown earlier in this report the distance between services has grown and although the proportion of trips under 1 mile undertaken by foot is around 80% and has remained so for many years, the actual proportion of trips of 1 mile or under is decreasing³. (Living Streets, 2001).

8.3 Time

8.3.1 Cultural values/social constructs of time.

In addition to distances changing so too has time. Time is not a straightforward concept, it can be viewed as a natural phenomenon; the seasons, the changing daylight over the day etc; but it is also a social construct, that is it has cultural values, for example, many of the time periods used in the workplace such as the week, the hour, the working day are all constructed periods of time. Perceptions of time are culturally defined and socially constructed and thus have many different values and meanings that vary between people, situations and across time (Virilio, 1986; McNaughten and Urry, 1998, Adam, 1995; Goodman, 2001). A number of different constructs of time have been identified of which Goodman (2001) argues that the following four: lifecycle time; necessary time; work time; and travel time are useful for understanding the motivation to walk.

8.3.2 Time definitions.

Each particular view (construct) of time has an impact on the attractiveness of walking and the decision to walk. Lifecycle time refers to a perception of linear progression from

² This factor added to four others: night-time (relates to personal security); luggage (relates to effort and comfort); heavy traffic; and the weather were found to explain 25% of the variance in the decision to walk.

³ This reduction in short trips may not be because the distances have grown, but may also be because the desire to use the car has grown

childhood to old age through family formation and employment⁴. Each of the stages is accompanied by a view as to what is the appropriate mode for the lifecycle stage. This is usually viewed as a progression from public transport to private car. Work time views time as a commodity and is usually focussed on time measured in hours and minutes; necessary time is a cyclic view of time on a diurnal scale and encompasses routine daily tasks; and finally, travel time is viewed as the time taken to get from origin to destination.

8.3.3 Time and gender roles.

Necessary time involves the complex scheduling of routine and daily domestic tasks. Many studies (Grieco, 1995; Turner and Grieco, 2000; Goodman, 2001; Hodgson, 2000) have identified that women's roles as carers and workers mean that they need to juggle various domestic and work commitments and use the car to ensure that they can fulfil both domestic caring roles and employment commitments. In one study (Goodman, 2001) it was found that mothers interviewed wanted to walk more and were worried about the effects of car travel on their children but they also valued very highly the perceived time saving from driving their children, and in particular driving them to school as part of the commute to work.

8.3.4 Implications for walking.

These multiple conceptions of time interact to influence (and in part explain) mode choice and attitudes to walking and its attractiveness. In the first instance we need to acknowledge that values of time and how we spend time are influenced by culture, consider for example stereotypes of Caribbean life and the culture of 'manyana' in comparison to the stereotype of the British workforce and 'the rat race'. In contemporary societies the view of time as a commodity and a valuable resource not to be wasted is part (at least) of the explanation for positive attitudes towards speed and the modes that seemed to be fast, that is, to save time. Thus any understanding of walking needs to take into consideration that people's view of time and the time they have available has not remained static. For some people who have very little time (they are time poor), for example, working mothers juggling caring and employment commitments, walking can be perceived as placing additional time burdens that they can ill afford. The evidence suggests that not only have the distances between services increased thus making the journeys to access them longer, but our perceptions of time have also made the time we have more valuable and that both these factors can affect the decision to be a pedestrian.

8.4 Security

8.4.1 Personal security.

Fears about personal safety are one factor that has been identified explicitly in empirical work as influencing both pedestrian route choice and mode choice. Studies have shown that some people do not walk because they are frightened about being attacked (Crime Concern, 1997, Hamilton 2000). This fear is different in character for men and women, children and adults, elderly and young, ethnic groups and for those with learning impairment and or physical impairment. There is also evidence that levels of fear are greater in urban areas and markedly higher in London compared with rural areas.

⁴ It should be noted that concepts of lifecycle stages are normative models and usually rely on inclusion in society as based on reproduction: family and employment and are not representative of many different sections of the population and can be exclusionary in their effects (Hodgson, 2001)

8.4.2 Personal security fears and night-time.

Anxieties about personal security are particularly acute at night time and many people, women in particular, organise journeys to avoid having to walk at night (e.g. Forward 1998, Mackett 2001, Living Streets 2001; Hamilton 2000). In most studies night-time or the absence of adequate street lighting or dark spots where potential assailants could hide were mentioned as deterring people from walking. Other factors included the presence of people (individuals and groups) 'hanging about'. Shift workers such as nurses in particular go to extraordinary lengths to make sure that they are not walking or catching public transport at night (Burkitt, 2000).

8.4.3 Security, safety and children.

Complex social trends have affected children's activities and particularly walking over the past twenty years. In recent years parents and guardians have come to fear that children will be attacked and abducted by strangers whilst in the street which has led to a restriction on children's freedom to play out. In addition there have been growing fears about the danger of road traffic that has meant that many more children are being escorted when they go out and not allowed to make journeys on their own. Hillman, Adams and Whitelegg (1990) found that parents restricted their children's freedom more because of their fears about road traffic than their fears about strangers assaulting their children. One result of these changes in perceptions and in the use and perceptions of time is that more and more parents are deciding that their children should be driven rather than walked to school (Bradshaw and Jones, 2000).

8.4.4 Perception and actual crime.

A word of caution, it is the belief of many that people's fear of crime is out of proportion to the actual incidence of crime, however, Crime Concern (1997) found that fear of crime when walking was related to personal experience and that retold by others. Personal experience of being stared at in an intimidating way or pushed or followed or other incivilities often lead to fear of other crimes but more importantly are more likely not to be reported.

8.4.5 Incivility.

Incivility actually seems to have a large impact on the transport system. Using the transport system by any mode involves a person in social interaction with other users. This social interaction involves implicit, unacknowledged agreements about what is considered to be polite or rude behaviour (both verbal and non-verbal) between people using the transport system. There have not been any studies on the impact of incivility on modal choice, but there are reported incidences of 'road rage' arising through what seem like quite minor infractions of what is considered to be polite behaviour. As stated earlier incivilities such as staring too long at someone, or banging into them getting on or off the bus had an impact on people's sense of security using the public transport. In addition pedestrians have complained about drivers parking vehicles on pavements usually in terms of the nuisance and impediment it causes to their mobility, but these are also examples of uncivil behaviour. They demonstrate a lack of concern about other potential users of the transport system. Given that little work has been done on travelling and civility it can only be speculated whether and what kind of impact it has on walking and more specifically the decision to walk.

8.5 Road traffic

Road traffic is also given as a factor in choosing not to walk. The level of traffic has been identified as deterring many pedestrians. Appleyard and Lintell (1972) found that in a comparison between three streets, the one with the greatest amount of traffic resulted in the

least amount of contact between people living on opposite sides of the road in the same street. Road traffic can encompass a number of different elements as well as volume, such as speed and other behaviours. It could also be extended to include such aspects of traffic as noise and pollutant emissions. There is work on perceptions of traffic emissions but there is no reported work on the impact of traffic emissions on pedestrian mode choice and as was said earlier in this report little work has been done on the impact of specific traffic behaviours on pedestrian mode choice.

8.6 The urban form

There are some studies that argue that the form, that is the structure and shape of the urban environment can impact on the decision to walk (Hass-Klau et al, 1994, Living Streets, 2001). For the purposes of this report urban form is distinct from land use as land use is being used to describe the location choice. Certain forms of structure in urban areas can make walking an unattractive experience as reported in the section on route choice but the contention is that this will also deter people from *choosing* to walk as well as choosing *where* to walk. Many argue that the urban environment should be designed and managed to make it an attractive space to be in so that people will be encouraged to socialise and use streets as 'living spaces'. This argument is principally because some authors claim that people attract other people but as we have seen in the discussion of personal security it is only certain behaviours that attract other people. Certain groupings of people and situation can deter pedestrians from walking in those areas, such as the centre of towns at night and particularly at weekends. Hass-Klau et al (1994) report that people in mixed gender groups and mixed ages congregating around the edges of squares and sitting drinking and talking are very conducive to attracting other pedestrians. In the discussion about urban form influencing pedestrian routes it is clear that urban environments can take on forms that allow cars to dominate and discourage people from using them.

8.7 The pedestrian environment

Conceptually it is difficult to understand how the small details of the pedestrian environment would have an impact on the decision to walk when compared to such factors as personal security and the time available, but there are some studies that suggest that the quality of the footpath and other facilities for pedestrians influence the decision to walk (Pedestrian's Association, 2000; Hass-Klau, Dowling and Nold, 1994; NCC, 1997; and Gehl, 1999). The particular factors identified in the studies are cleanliness, including the presence of litter, rubbish, dog dirt and the condition of the pavement. There is also evidence that provision for pedestrians in cities such as Göthenburg (Sweden); York (UK) and Portland (USA) is encouraging more walking journeys. There are some theoretical perspectives on social exclusion and power (Gaventa, 1980, Smith, 1999) that argue that the continual sight of shabby, poorly maintained equipment and facilities such as broken bus shelters or cracked pavements reinforces a feeling of neglect and inferiority compared to other road users, that is of being second class citizens and that this feeling or perceived lack of status detracts from the attractiveness of walking.

8.8 Effort required

Two studies have reported that a further factor in choosing to walk is comfort (Forward 1998, Stradling 2000). Unfortunately in most studies comfort is never really understood or explained. For most it is also correlated with the weather and in the ADONIS project work

(Forward 1998) it was not found to be a significant factor. In Stradling (2002) effort rather than comfort was looked at in a study evaluating the use of public transport interchanges. In the study effort was defined as emotional (affective), mental (cognitive) and physical. The study indicated that looking at the decision to use public transport involves all three aspects of effort and that to make public transport more attractive the emotional and mental effort as well as the physical effort needs to be addressed. Although this research looks at the decision to use public transport it indicates a useful way forward to consider effort in the decision to walk.

8.9 The weather

The weather often comes up in the lists of factors that people find significant in the decision to walk. The work on short trips in the ADONIS project found that dry weather had a positive impact on the decision to walk (Forward, 1998). It is not only the discomfort of walking in inclement weather that can deter people from walking but also the fact that one has to dress in the appropriate clothes for the weather. In a study on green travel plans a survey respondent described the teasing from colleagues when she uses public transport (which obviously includes an element of walking) for commuting to work, because she has to dress for the weather. She described how her colleagues would make remarks and laugh about her dress such as ‘is it snowing out there’. She described herself as wanting to use a car to avoid being different (Hodgson 2000).

8.10 Other factors

Those who already walked held additional positive beliefs about the benefits of walking. In particular they believed that it was good for fitness and health, was relaxed and gave one a sense of independence and freedom (Forward 1998). Those who already routinely made walk journeys to commute also had positive beliefs about the time required to do the journey. Other factors identified with walking include the positive impact it has on a person’s psychological well-being. In the one article available on this, Hillman (1997) argues that walking calms the “whirling agitations into an organic rhythm” (1997:11).

9. Problems faced by pedestrians

Numerous surveys have asked pedestrians about the kinds of problems they face on our roads. Table 2 pulls together findings from a number of surveys.

Within this there is to some degree a hierarchy of problems which relates to severity and degree and longevity of effect, though also, perhaps surprisingly, there is no clear relationship between this hierarchy and the impact on levels of walking. At the top level of the hierarchy there are problems which impact on the health of the pedestrian both short and long term. Next there are problems which are to some degree perceptual, but which can have a considerable influence on behaviour. Finally there are issues to do with travel delays and inconvenience. Of the three, the first and third are most easy to obtain data on the scale of the effects, the second rather less so.

Figure 1 shows a possible set of relationships between the consequence of various impacts faced by pedestrians and the likelihood of a given effect happening. Each impact is represented as a line indicating that there is a range of possible values – for example road

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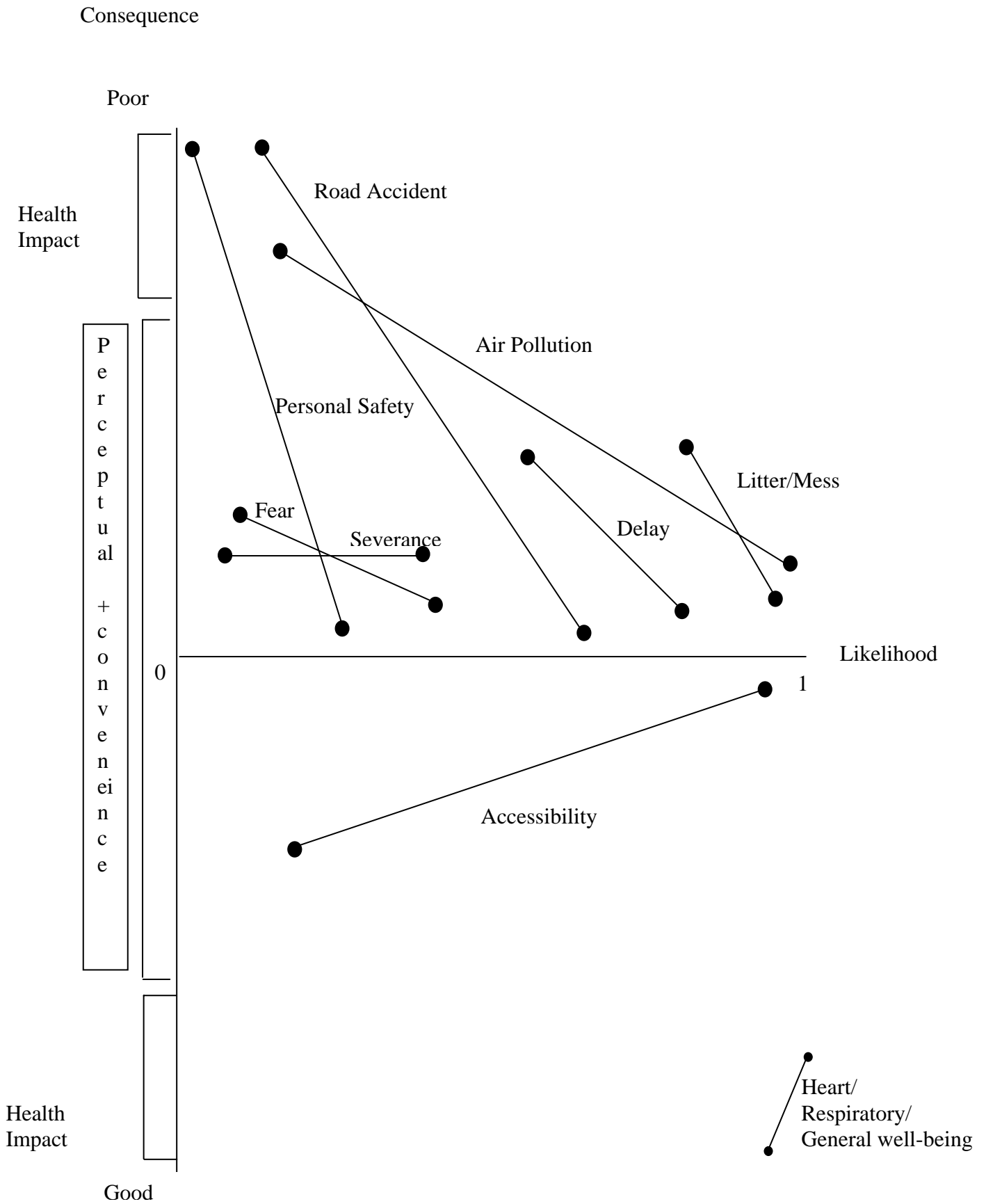
accidents at one end of the spectrum can result in the death of pedestrians, but this eventuality is reasonably unlikely – at the other end of the spectrum they can result in minor injuries, an eventuality that occurs with greater frequency. Clearly for most of these impacts the two points at either end of the spectrum for each impact are unlikely in reality to be joined by straight lines, but the actual nature of the relationship is unknown.

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Table 2 Problems faced by pedestrians

IHT (2000) – from MORI (1995) and NCC (1998)	Pedestrians Association, 2001	NCC, 1979/80	Edinburgh, 1993
<p>A Poor quality pedestrian environment Poor footway maintenance and lack of ice/snow clearance Litter and a general appearance of neglect Dog fouling Splashing by drivers Buildings that ‘turn their backs’ on the street, ugly street scenes and absence of surveillance Cul-de-sac housing layouts that turn suburban estates into mazes and increase walking distances Lack of benches and public lavatories Lack of road signs for visitors on foot Steep gradients and/or steps</p>	<p>Badly managed/maintained streets</p> <p>Street environment is grey and ugly</p> <p>Lack of basic amenities Lack of pedestrian information</p> <p>Traffic is noisy/smelly Roads designed for vehicles</p>	<p>Poor road surface Dirty streets</p> <p>Dust/smell</p>	<p>Damaged pavements</p> <p>Poor road environment</p> <p>Air pollution/Noise Too much traffic</p>
<p>Inadequate pedestrian safety Fear of road accidents Aggressively designed vehicles and, at night, high powered headlights Obstructions on footways: roadworks, rubbish bins and sacks, poorly sighted traffic sign poles, bus shelters, locked bicycles and parked cars Inadequate or broken street lighting Lack of or inadequate footways – particularly in and between villages and the narrower streets of old towns and cities Illegal cycling on pavements and the sharing of some off-road paths with cyclists Inadequate green time at signal controlled crossings</p>	<p>Footways blocked by obstacles</p> <p>Footways too narrow</p> <p>Cyclists ride on footways</p> <p>Short times at crossings and often not located in right places</p>	<p>Obstacles</p> <p>Poor street lighting</p> <p>Problems crossing</p>	<p>Fear of crossing roads Speed of traffic</p> <p>Congested footways</p> <p>Lack of crossings/long waits</p>
<p>Inadequate personal security Fear of assault, graffiti and withdrawal of police areas Highly publicised child killings and abductions Dangerous dogs Intimidation from beggars and drunks</p>	<p>Changes in policing priorities</p>		

Figure 1 Pedestrian Problems – Consequences and Likelihood



9.1 Health related problems

It is this area where there is most data available to document the scale of the problem and where most research has concentrated.

Road safety: This is an area where considerable research has been undertaken and one in which reliable data (at least for more severe and fatal accidents) is available nationally. Figures show that in GB in 2000, 857 pedestrians were killed, 8641 were seriously injured and 32535 were slightly injured. 3226 of those killed or seriously injured were aged 15 or under. Rather less information is available on more minor accidents, particularly those involving individual pedestrians tripping on kerbs, though figures quoted in IHT (2000) based on work done by NCC (1987) suggest around 250,000 accidents per year caused by tripping/falling incidents on the walking surface, though no information is given on severity.

Air pollution: Again there is considerable data available on pollution levels within urban areas, either modelled or measured. There are however considerable problems of interpretation and a limited understanding of exposure patterns of pedestrians to different air pollution levels. Research undertaken by the Committee on the Medical Effects of Air Pollutants (COMEAP, 1998) shows that significant numbers of people in the UK suffer adverse health effects (including premature death) from air pollution. However, it is currently impossible to disentangle the extent to which these health impacts result from pedestrian activity compared to other activities. Some studies have shown that air pollution levels in vehicles are actually higher than those on surrounding footways (see for example the review by ETA, 1997).

Personal security: It has not been possible to obtain figures which document the scale of crime against the person which occurs on the street to people as pedestrians.

Inactivity: The role of physical activity in maintaining good health and wellbeing is well known and increasingly receiving media and public attention. Clearly walking is one way in which an individual's level of activity can be increased. Current recommendations of activity levels to produce health benefits suggest a minimum of 20 or more occasions of moderate or vigorous activity of at least 30 minutes duration over a period of 4 weeks. A good summary of possible risks associated with inactivity such as increased susceptibility to coronary heart disease is given in Crombie et al (2000)

9.2 Perceptual problems

At the extreme it is possible that some of the perceptual problems could in the longer term contribute to health issues.

Fear/intimidation/danger: It is very difficult to quantify scale of this problem and little research work exists to back up anecdotal evidence. Clearly the degree of fear, intimidation and danger is closely linked to perceived levels of road safety and personal safety, though perhaps not as well linked to the actual levels of risk associated with such problems. Fear, intimidation and danger are problems which range from extreme responses for a small number of people to quite rational assessments of relative risk of particular locations by many. Much anecdotal evidence focuses on particular locations which are known to be 'dangerous', but which have very small or zero accident records, often because no-one will try to cross at such a location because of a recognition of the level of danger (or a level of fear or intimidation).

Severance: The divisive effects that infrastructure and traffic can have upon communities and upon the scope of individuals to move around within the urban area. Particularly a problem which affects younger and older age groups, the former partly because of the degree of 'licence' permitted them by their parents (see for example work by Tate, 1997), the latter more resulting from the barrier effects of heavy and fast moving traffic. Very little work has been done which documents either the thresholds at which severance becomes a problem (one example is work by May et al, 1985 which identified thresholds of activity based on traffic flow levels) or the overall scale and severity of the problem within the UK.

Other low grade problems: these can include things like mess, litter, broken pavements or the overall appearance of the street scene. Many such problems are based on a very personal assessment of a location and may change very rapidly over time, or be based on a formative experience. Other sensory inputs could also effect perception of a location, such as smell, fear of heights, claustrophobia or agoraphobia.

9.3 Inconvenience

Pedestrian delay: Issues here relate to delay arising from poorly placed street furniture, size and width of pavements affecting level of service and road crossing delay. A reasonable amount of work exists which documents the scale of these problems. Evidence suggests that delay can, for short urban journeys, be a significant proportion of overall journey time, particularly where a pedestrian is forced to wait at a sequence of signal-controlled crossing facilities. For some user groups, especially children and the elderly crossing at non-signalised points in a busy road network can also be a considerable problem. There is also anecdotal evidence that delays and frustration can lead to risk-taking behaviour and ultimately accidents.

Land-use and planning effects: Given increasing dependence upon the motor car and decentralisation of many aspects of urban areas many urban distances are increasing reducing the acceptability of walking for such journeys.

10. Pedestrian Policy

The current situation is that walking has been in long term decline for many years, but it is still an important mode.

In a way walking has been overlooked because of its very ubiquity and the fact that it is seen as a benign mode of transport. By its very nature walking is something which virtually everyone does and which is self evidently an important mode, but which causes few problems to others and is relatively inexpensive to cater for. These advantages can sometimes lead to walking being overlooked as the more "obvious" modes, in terms of impacts and person kilometres travelled, are catered for. One of the first to draw explicit attention to the importance of walking as a mode of transport and the fact that it was in being neglected were Hillman and Whalley (1979), who concluded that:

"in both transport policy and practice, it [walking] has been overlooked or, at the least, has been inadequately recognised."

However, even after this report, there was little explicit National Government recognition that walking required consideration beyond simply providing facilities. The dominant consideration was safety (by which was meant the reduction or elimination of accidents),

which led to a segregationist design philosophy. As the pedestrian was usually seen as the less important road user, this often meant that pedestrian convenience was sacrificed in order to remove the vulnerable pedestrian from the danger. Segregation almost inevitably led to the pedestrian losing out in terms of convenience as the more “important” mode was given priority. The most extreme form of this approach was pedestrian subways and footbridges, but this philosophy also underlies the use of guardrails, pelican and other light controlled crossings etc. While subways are less favoured these days, design guidance still implicitly emphasises that pedestrians should be segregated from the danger for their own good, rather than emphasising pedestrian convenience.

The “New Realism” approach emerged at the beginning of the 1990s (Goodwin et al, 1991) in the wake of the 1989 NRTF (DoT, 1989). This explicitly recognised the impossibility of catering for ever increasing amounts of motorised traffic (especially in urban areas) and suggested that a mix of new approaches were necessary. One of the new approaches was to encourage journeys on foot and by cycle instead of by car, in order to reduce the pressure on the roads. A National Cycle Strategy was published in 1996 (DoT, 1996a) which included ambitious targets for cycle use. A consultation document on the development of a walking strategy and good practice guidance was issued by the walking steering group (DoT, 1996b), but the actual strategy itself was delayed.

In 1998, the Government published the White Paper on Transport (DETR, 1998) which emphasised the importance of walking and sought to make it a more attractive mode with the aim of encouraging people to walk for short journeys. Local transport improvements were to be delivered through Local Transport Plans (LTPs) , prepared by local authorities covering all aspects of local transport. The most recent guidance on the preparation of LTPs (DETR, 2000a) emphasises the importance of walking and encourages local authorities to develop Local Walking Strategies (LWS) and monitor local walking activity. The guidance states that walking should be taken into account in a range of different transport developments and that where suppressed demand exists, improvements could include the reallocation of road space to pedestrians.

At one stage it was possible that the National Walking Strategy would become a “daughter” document of the White Paper, but it was eventually issued in downgraded form as an advice note to local authorities (DETR, 2000b) without any national targets for walking. The advice did include suggestions that local targets for walking or for relevant service standards could be adopted and brought together a number of suggestions and examples of good practice. The tone of the advice was very much on improving conditions for walking and not on radical actions to address wider transport issues. In the section on reallocating road space, for instance, after mentioning possible improvements for pedestrians, the advice states that:

“The important point is that there should be a balanced package of measures for traffic management, not simply a restriction on motorists.”

Disappointingly for many seeking to encourage local authorities to take walking seriously as an alternative to car use, the introduction to the advice makes the comment that:

“None of this by itself will make much difference to car mileage, air pollution, or global warming – though the effects will be positive.”

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The Government's ten year plan for transport (DETR, 2000c) emphasised large scale projects, and did not include a target for walking, even though there were targets for many other modes of transport. The ten year plan did lead to an increase in resources for local transport which went towards funding the first full LTPs, presented by local authorities in July 2000.

Late in 2000, the Environment, Transport and Regional Affairs Committee decided to examine the Government's record on walking, the committee was particularly interested in:

- the possible future role of walking in towns and cities
- the reasons for the decline in walking and what could be done to reverse it
- whether appropriate skills and training are available
- whether greater priority should be given to walking
- whether national targets for walking should be set

The committee's report was published in 2001 (ETRA, 2001). A useful summary of the Committee's proceedings and conclusions is provided by Tolley (2001). Overall the report was critical of the Government's policy on walking and made a number of detailed recommendations about research into walking, personal security, professional training, coordination of policies with regard to walking, the public health aspects of walking, prioritisation of funds for walking and planning issues. The Committee's strongest recommendations concerned changing the underlying philosophy of pedestrian provision, giving priority to walking and the establishment of a National Walking Strategy with targets.

Much of the evidence submitted to the committee concerned the poor conditions for walking and it is unsurprising that they recommended greater spending on providing for walking. However, the Committee went much further than this and explicitly challenged the "prevailing orthodoxy of accident reduction" which underlies the design of much current infrastructure for pedestrians, instead, it suggested a policy of danger reduction because "It can be more effective in reducing pedestrian casualties, lead to better urban design and is more convenient for pedestrians." The report illustrates the point by drawing attention to the road conditions near to the Palace of Westminster

"...the council has installed a staggered crossing where pedestrians cross half the road on one green light and then have to wait in a pen in the centre for another. The aim is to speed traffic flows and protect those on foot, but it does neither effectively because the traffic soon slows down at bottlenecks close by and many pedestrians ignore it in frustration at the inconvenience."

Instead of trying to restrict pedestrians with the aim of reducing casualties, the committee was suggesting reducing the danger at source by, for instance, reducing traffic volumes and speeds. It is worth noting that almost any worthwhile safety improvement involves some element of inconvenience, what is being suggested here is a reallocation of this inevitable restraint from the pedestrians to the vehicular traffic. Part of the reason for restricting pedestrians is because they are seen as an "accident risk" and therefore would (or should) gladly exchange convenience for enhanced "safety". The Committee is explicitly challenging this prevailing orthodoxy and separating out what had formerly been thought of as coincident concerns, that is accident reduction for pedestrians and design which is attractive for pedestrians (a confusion which, historically, has not been made for motor vehicular traffic).

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The clear aim is to achieve an environment which is attractive for pedestrians and safe in the wider sense of the source of danger being restricted. The justification which underlies this is that pedestrian traffic should be seen as the more important traffic in these kinds of conditions.

Tolley (2001) reports that the City of Westminster (the relevant local authority) responded to the comments on the local road conditions by the Committee:

“Regrettably, pedestrians often misuse the crossing facilities provided for them and choose to risk the crossing of some of London’s busiest roads away from the improved safety that many crossings provide and until such time as there is legislation against this practise the problem will persist“

This is an extraordinarily revealing comment. Essentially, the point that the Committee was seeking to make – that the facilities were so awful that pedestrians simply ignore them, even at significant risk to themselves - is overlooked. The comment seems to be interpreting the problem as an accident reduction one and suggesting that if only the pedestrians would behave then the problem would disappear.

Underlying the latter approach one can also detect a certain frustration with the very nature of pedestrian behaviour. At the scale of the urban street, motor vehicles simply don’t have the space or the manoeuvrability to behave in the same wide range of different ways as pedestrians do, they are also much more homogenous in terms of abilities and motivations – most motor vehicles are easily capable of the urban speed limits and are simply trying to get from A to B. In contrast pedestrians usually have the space and the motivation to display a wide range of different behaviours including abruptly stopping and changing direction, or simply standing around, sensitivity to even relatively minor diversions and detail in the streetscape, taking advantage of gaps in the traffic, especially if in a hurry and using detailed body language to facilitate their efficient movement in proximity to other pedestrians. Much of this is related to a wider variety of journey purposes (the rushing commuter versus the window shopper), but pedestrians also vary widely in their physical abilities. In a sense, while the infrastructure required is expensive and technically complex, motor vehicles are much easier to cater for because they are constrained to behave in much more predictable ways (at least in the urban context).

The comment from the City of Westminster seems to suggest a certain frustration at pedestrian freedom and unpredictability, but rather than design facilities to match these characteristics, reveals a resignation that nothing can be done until pedestrians can be compelled to behave in a more responsible manner.

The Committee made a number of detailed recommendations about the physical environment for walking, but was also concerned about the wider urban environment and the aesthetics of the street. The Committee also recommended the establishing of a National Walking Strategy with targets for walking at a national level.

The Government published its response to the Committee’s report in November 2001 (DTLR, 2001) which commented on each of the Committee’s recommendations. In many cases there was agreement with many of the points made and the Government agreed to publish a national strategy for walking but not to set national targets for walking.

Confusingly, the Government stated that it was in favour of both accident reduction and danger reduction objectives, these two are not incompatible, but the detail of how accident reduction is to be addressed is crucial – by restraining the motorised vehicle or the freedom of the pedestrian. The Government rejected the Committee's recommendation to withdraw two Local Transport Notes (LTNs) which dealt with pedestrian crossing facilities and defended its position in specifying targets in terms of casualty reductions but agreed to issue policy guidance on developing a pedestrian friendly environment. The Government endorsed the Committee's recommendation that pedestrian's should be given priority on walking routes, but left this up to local authorities and it was unclear what this might mean in practice. The more radical suggestion of the Committee, that the urban route network should be re-classified "to take account of all its functions" was rejected. Overall, while the Government was generally amenable to many of the suggestions of the Committee, it was unwilling to alter its policies on a number of key points. It is unclear whether anything will change significantly in the wake of the Committee's report.

What the Committee's report does do, is to give a few pointers as to how conditions might be improved for pedestrians. Most immediately, the design of pedestrian facilities could be changed to give more priority to pedestrians and the Committee's detailed recommendations cover this. Secondly, the emphasis on providing for pedestrians could be shifted from an understandable desire to protect pedestrians for their own sake, with the unfortunate side effects of making walking less convenient (and in the extreme case, making it so inconvenient that facilities are misused), towards reducing the danger at source, as suggested by the danger reduction approach. This means reducing the speed and volume of motorised traffic, but also redesigning the street environment to make it clear that the pedestrian is the most important road user, by concentrating on pedestrian desire lines and fitting facilities for motorised user round these, rather than the other way round. In essence this is associated with the Committee's underlying concerns for urban renaissance and bringing together the different agencies and professionals concerned with street management so that there is a coordinated approach to the function and appearance of streets and public spaces. Underlying this approach is the idea of a hierarchy of road users which puts pedestrians at the top. This is already recommended in the Government guidance on LTPs (DETR, 2000a), but the crucial aspect is the way that such a hierarchy is used and the weight it carries within the local authority applying it. This requires a real commitment, on the part of those planning the urban streetscape, to the pedestrian and a willingness to inconvenience the motorist if required.

Tolley (2001) points out that the wider issues such as high quality urban environments and urban renaissance are more in tune with public thinking about what is important to them, rather than discussions about the requirements of walking as transport. This approach is reflected in the recent re-launch of The Pedestrians Association as "Living Streets" in order to emphasise the importance of streets and public spaces for community life (Pedestrians Association, 2001). This focusing on what people do while out walking and the wider importance of the street as a community space is undoubtedly important, but it does risk diverting attention from the role of walking as an important way of getting from A to B. There must be some concern that this will draw funds towards spaces where "...neighbours gossip, where markets flourish and where people sit and pass the time of day" (Pedestrians Association, 2001) at the risk of neglecting conditions for pedestrians who simply want to get somewhere.

However, it is clear that ‘liveability’ is a concept that people feel more able to understand and respond to than ‘walking as transport’ and it is therefore more politically important. This was underlined when the Prime Minister made an important speech in the run up to the 2001 General Election on quality of life for people in urban areas (Blair, 2001). Many of the issues he focussed on were of direct relevance to walking, such as safer streets, clean and well-managed streets, reducing traffic danger and creating high quality public spaces, but the emphasis was on the local environment and the importance of ‘public goods’ rather than transport.

The Environment, Transport and Regional Affairs Committee report also takes issue with the Government’s assertion in their advice to local authorities that “none of this by itself will make much difference to car mileage, air pollution or global warming.” and suggests that walking could have an impact on congestion and pollution in urban areas. However, the decision to walk for many of the walk trips that are most important from a transport point of view may have more to do with the availability and convenience of other modes (most obviously car), trip distance, weather and so on, rather than the quality of the pedestrian environment. The Government’s response to the Committee’s report implicitly recognises this in saying that:

“The main factor underlying the decline in walking is well understood and also underlies the historic declines in cycling and in the use of local bus services. It is the increasing ownership of the private car, which offers a more convenient alternative than all of the modes mentioned for most journeys, albeit at a cost in terms of personal health and environmental effects including congestion and deterioration in the walking environment.”

As such, in order to reverse the decline in walking, we have to consider the wider transport issues, most obviously making it more expensive or less convenient to own and travel by car and land use planning to make trip lengths shorter and create denser development.

11. Conclusions

This study has attempted to bring together some of the findings from the large and disparate literature on pedestrians and the problems they face when using the road system. As an introduction to later aspects of the work in the Measuring Pedestrian Accessibility project it has focussed specifically on the problems faced by pedestrians and the factors which influence their choice in terms of the routes they select and the choice of whether to walk or not for a specific journey.

The report has also tried to put these findings into some kind of context by examining the policy background in the UK in terms of provision for pedestrians at a national and local level.

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