

Executive Summary

Overview

This report summarises current data and research relating to children and cycling with a particular emphasis on cycling to school and the role of cycle training in bringing about more cycling to school. This report is part of a wider Transport for London (TfL) research project seeking to understand what can be done to get more children cycling in London. The wider research will include qualitative and quantitative research among Londoners specifically on the barriers to children cycling, how these can be overcome and how cycle training can help. This report therefore summarises previous research of relevance to the wider TfL research project, helping to identify gaps in the current knowledge. Included within the review are published peer reviewed papers and reports produced by government agencies and businesses.

The main objectives for the wider TfL research are to:

- i. Establish the current baseline numbers of children cycling to school and receiving training in London split between primary and secondary age
- ii. Understand how barriers to children cycling to school can be overcome split by primary and secondary age
- iii. Understand how cycle training for parents links to children cycling to school split by primary and secondary age
- iv. Understand how child cycle training can be improved to maximise children cycling to school for primary age and secondary age

There is mixed existing evidence for objectives 1, 2 and 4 and very limited evidence about the link between cycle training for parents and children cycling to school.

Why does child cycling matter?

Child cycling has the potential to deliver both health and transport outcomes. There is an extensive literature on the health benefits of cycling. Benefits include associations with general good health and less chronic illness among regular cyclists and inverse associations with body mass index, cholesterol, high blood pressure and diabetes.

Getting children cycling at a young age is likely to be key to continued cycling throughout childhood and into adulthood. Research has shown that cycling to school at age 10 strongly tracks cycling to school at age 16, suggesting that travel habits formed early in a child's school career determine how they travel throughout their time at school. While there is no specific research into a link between cycling as children and cycling as adults, the literature does suggest a correlation between levels of physical activity as children and physical activity as adults. Research among adults also found that adults with a strong cycling habit made less-conscious decisions to cycle for given journeys compared with those who had weaker cycling habits. This suggests the formation of cycling habits at an early age is an important factor in creating regular adult cyclists.

Past and present trends in children cycling

Since the 1990s the level of cycling for the journey to school has been low, accounting for around two per cent of journeys in the UK including London. This low level of cycling has remained fairly static since the mid-1990s, however, between the mid-1970s and the mid-

1990s the average number of miles cycled by children fell by 41 per cent. In London, while child cycling levels have remained static since 2002/03, there have been changes in the use of other modes, for example, car use has declined by approximately five percentage points and bus use has increased by around seven percentage points.

This decline in the level of child cycling may in part be explained by falling levels of children's independent mobility. Since the 1970s there has been a decrease in the number of children allowed by their parents to undertake independent trips such as the journey to school. The literature concludes that independent mobility is an important factor in determining physical activity levels among children. Higher levels of independent mobility were also associated with higher levels of cycling to school.

Like adults, children cycle for leisure as well as utility trips (such as the journey to school). It is likely that many child leisure rides go unrecorded because of the absence of a means of recording these rides. For example, school travel surveys or the National Travel Survey may pick up journeys to school or key destinations but are unlikely to identify when children have spent playtime riding a bike. Playtime cycling may be important because, like adults with leisure cycling, it enables children to engage positively with cycling and enables them to develop basic cycling skills.

Cycling safety among children

Department for Transport (DfT) statistics show that 324 children were killed or seriously injured (KSI) while cycling in 2012, the lowest number for 30 years and a continuation of a downward trend since 1979, even in the context of a decline in the level of child cycling over the same period. Of these KSIs, a very small proportion relates to the journey to school – in 2007, of 522 child cycling KSIs, three related to the journey to school. It should be recognised that a decline in KSI is only part of the cycle safety picture and does not necessarily mean that safety in the broadest sense has improved. The fall in KSI could be explained by an increase in perceptions of danger among parents and carers, and the deployment of measures to avoid danger, as much as by a reduction in actual danger.

Attitudes and motivators for child cycling

Attitudes to travel generally have been found to vary by age among children; for the youngest children the fun aspects of transport are most important. Young teenagers value the independence offered by non-car modes and older teenagers tend to aspire to car ownership and use.

Cycling has four main attractions for children – it is fun, expands their territory, is a social activity and allows for interaction with people and the environment. In comparison to adults, children have more positive views about cycling and are more open-minded about transport choices generally.

The key barriers to cycling identified in the literature are:

- Road danger – concerns about road danger, particularly among parents, carers and school staff
- Attitudes – car culture and aspirations towards car ownership and use, a concern among parents not to expose their children to activities that may be perceived as dangerous and self-image concerns among children

- Convenience – cycling as an inconvenient mode for parents particularly for accompanied journeys to school, where driving or walking with a child to school may be perceived by parents as easier than cycling
- Distance – the literature suggests distances of between 0.7km and 1.5km from school are most conducive to cycling

There is less evidence in the literature for how these barriers and motivators affect different ‘types’ of children, for example, how these factors vary by age, gender and socio-demographics.

Cycle training

Across London and the UK cycle training is a measure widely used by authorities to improve cycle safety and increase levels of cycling. In the literature, the term ‘cycle training’ has been used in reference to many types of training. However, when cycle training is referred to in contemporary London and UK policy it usually refers to the Department for Transport’s National Standard for cycle training, Bikeability. The course content and delivery standards for Bikeability are clearly specified with discrete outcomes identified for each of its three cycling skill levels.

When considering the evidence for the effectiveness of cycle training, care must be taken as to the nature of the training analysed. Conclusions drawn should be viewed in the context of the type of the training and should not per se be interpreted as applicable to Bikeability cycle training. Even within Bikeability training, there is scope for some flexibility in delivery.

Levels of cycle training delivery

TfL figures for 2011/12 show a total of 28,569 children participated in Bikeability cycle training at Level 2 (basic on-road training), and 3,007 at Level 3 (advanced on-road training). Across the rest of England, DfT funding delivered 293,360 Level 2 Bikeability places. The current data does not enable us to distinguish between primary and secondary school training places, although Level 3 is most likely to be delivered to secondary school age children only and the bulk of Level 2 training takes place in primary schools.

While these figures tell us the baseline numbers trained, they do not help us to understand what proportion of eligible children receive training. Further analysis is required to compare these numbers against school year-group data held by the Department for Education.

Child cycle training and safer cycling

There is some evidence for a positive association between cycle training and safer cycling:

- Trained children are three times less likely to become a casualty than those who have not received cycle training
- Trained children were less inclined towards risky behaviour than untrained children
- Children and parents reported improvements in children’s abilities to judge risk and greater confidence while cycling on the road
- Training increases cycling skill among participants – adults and children

Cycle training and more cycling

There is also evidence for an association between cycle training and more cycling, although research on this issue tends to have been undertaken by government agencies or businesses

with an interest in delivery and therefore may be inclined towards evaluation bias. Key findings include:

- Evaluation of the national Travelling to School Initiative found that schools participating in cycle training had higher levels of cycling to school than those not participating
- In Hertfordshire, the level of cycling to secondary schools was found to have increased over time where all feeder primary schools had participated in Bikeability cycle training
- Parents of children in Merseyside who had received cycle training said their children's frequency of cycling had increased after the training, particularly for leisure purposes

Research among adults suggests that those who have received cycle training increase their frequency of cycling after training, although for adults it is more likely to have been a personal choice to undertake training perhaps in response to or preparation for starting to cycle. There is no evidence in the literature of a link between cycle training for parents leading to more cycling by their children.

The implications for cycle training

There is evidence that cycle training increases the skill and confidence of trainees and may result in increased frequency of cycling after training. Cycle training plays a positive role in influencing the perceptions of parents, helping to allay concerns about cycling safety.

However, consideration of the barriers to child cycling suggests that cycle training alone is unlikely to result in more cycling. While training has a positive effect on parental perceptions of their child's abilities, concern about the safety of the environment in which their children must cycle will remain.

Therefore cycle training should be supported by complementary measures that both address the environment in which children cycle and parental perceptions of that environment.

Priorities for further research

This review of the literature has highlighted gaps in the current knowledge that could be explored through further research including the quantitative and qualitative stages of the wider TfL research. These research priorities are:

- Exploration of whether cycle training for parents can help bring about more cycling among children and more widely, the effect of adult (parent) cyclists' behaviour on children
- Quantify the full extent of child cycling to enable a better understanding of the type of trips children make and the proportion of cycling time that is spent on utility versus recreational cycling
- Understand if cycle training has an effect on levels of leisure cycling, as well as cycling to school
- Understand the extent to which the barriers and motivators for child cycling vary by age, gender, socio-demographics and ethnicity
- Research the acceptable distance for cycling to school and how it varies between adults and children of different ages plus interaction with perceived safety of cycle routes

1 Introduction

The purpose of this report

- 1.1 The aim of this report is to summarise the current knowledge relating to children and cycling, with a particular emphasis on cycling to school and the role of child cycle training in encouraging more cycling. This is part of a wider Transport for London (TfL) research project, which seeks to understand what could be done to get more children cycling in London. The wider research includes qualitative and quantitative research among Londoners specifically on the barriers to children cycling, how these can be overcome and the role child cycle training plays. The main objectives for the wider TfL research are to:
- v. Establish the current baseline numbers of children cycling to school and receiving training in London split between primary and secondary age
 - vi. Understand how barriers to children cycling to school can be overcome split by primary and secondary age
 - vii. Understand how cycle training for parents links to children cycling to school split by primary and secondary age
 - viii. Understand how child cycle training can be improved to maximise children cycling to school for primary age and secondary age
- 1.2 The overall structure follows this sequence:
- A summary of our approach and the context of this review
 - The facts about children cycling
 - The barriers to children cycling and how these barriers may be overcome
 - The contribution of cycle training to more children cycling
 - Any gaps between the current knowledge and the findings sought from the wider research of which this research forms a part.

Approach

Sources and scope

- 1.3 Included within this review are published peer reviewed papers and those drawn from the so-called grey literature produced by government agencies or businesses. For the purpose of this review children are considered to be young people between the ages of 5 and 16 years (i.e. primary and secondary school age children). Where relevant research among students (i.e. over the age of 16 but in full time education) or adults has been found it has been included in the review and identified it as such. This report draws on both UK and international evidence and research.

Limitations

- 1.4 It is important to recognise some limitations within the current literature. Chillon et al. (2011) note that research into active travel is a relatively new field and that the evaluation of programmes and initiatives has a tendency to be hampered by weak evaluation methods. The literature tends to be broad in its coverage but can lack depth; Ogilvie and Panter (2012) provided a critique of current research, highlighting a tendency for evaluation bias:
- The studies are often conducted and reported by organisations involved in the delivery of the interventions being evaluated
 - The relevance of chosen control groups is not always clear
 - The studies are rarely subjected to peer review
- 1.5 In light of this, conclusions emerging from the literature should be regarded with some caution. Wherever possible or necessary, relevant caveats have been noted in the review.
- 1.6 Note that the review is focussed on published papers and does not include our own analysis of source data.

Child cycling

- 1.7 Like adults, children cycle for leisure as well as 'utility' trips. Utility trips in the case of children may include journeys to school, the shops or to visit friends' houses. It is likely that many leisure rides – cycling as play – among children go unrecorded because of the absence of a means of recording these rides. For example, school travel surveys may pick up journeys to school and the National Travel Survey may pick up journeys to school and other trips to and from a destination that children have made by bike. However, these surveys are less likely to identify when children have spent 'play time' riding a bike. The literature suggests play time cycling is also important for three reasons:
- Positive engagement with the cycling – research among adults (TfL, 2012a) found that leisure cycling has many positive associations and that utility cycling is an easier 'next step' for leisure cyclists than for those who don't cycle at all. Similarly cycling for play may lead children to form positive associations with, and attitudes towards, cycling.
 - Development of basic cycle skills – cycling for play enables children to practise their riding skills in the most basic sense, enabling them to develop the essential motor and control skills they need to ride anywhere. This may accelerate the learning of new skills during cycle training, as children need focus less on basic control skills (Ducheyne et al., 2013).
 - Bicycles as toys – however, it could also be speculated that if children only associate their bicycles with play the link to bicycles as a means of transport may be missed.

- 1.8 Therefore we might expect cycle training to lead to more cycling for recreation or other journey types that are not necessarily captured through standard travel surveys. We have not sought to limit our review to research into children cycling in the context of journeys to school, although most studies do tend to focus on this.

Cycle training

- 1.9 In the literature, the term ‘cycle training’ has been used in reference to many types of training. However, when cycle training is referred to in contemporary UK and London policy it generally refers to training delivered in accordance with the Department for Transport’s National Standard for cycle training. Bikeability, launched in 2006/07 is the government’s branding and award scheme for the National Standard. Bikeability cycle training must be delivered by suitably qualified instructors in accordance with clearly defined rules for the duration of the training and the ratio of instructors to trainees. The course content for Bikeability is also clearly specified with discrete outcomes identified for each of its three levels:

- Level 1 – trainees learn basic control skills in a traffic-free environment
- Level 2 - trainees receive basic on-road training in simple road environments
- Level 3 - trainees learn advanced skills and training takes place in more complex road environments often in busier traffic conditions

- 1.10 Care needs to be taken as to the nature of the training in question when reviewing the literature on cycle training, particularly when considering evidence for the effectiveness of training. Conclusions drawn should be viewed in the context of the type of the training and should not per se be interpreted as applicable to Bikeability cycle training or indeed any other types of training. Even within Bikeability training, there is scope for some flexibility in delivery (DfT, 2013a). The key issue, as stated by Macarthur et al. (1998, p.119) is “whether the intervention was sufficiently potent to effect change. Both the quality and quantity of an intervention contribute to its potency”.

The policy context

- 1.11 Since 2000 the daily average number of cycle trips in London has increased from 270,000 to 500,000 and cycling on roads managed by Transport for London has increased by 176 per cent. Despite this substantial rise since 2000, the latest figures suggest that the rate of growth may have started to slow in 2012 (TfL, 2013a).
- 1.12 In March 2013 the Greater London Authority published The Mayor’s Vision for Cycling in London (GLA, 2013). Four overarching outcomes comprise the vision – delivery of high quality cycle routes, safer streets, more people cycling and better places for everyone. These outcomes and the proposals emerging from the vision are summarised in Appendix A.
- 1.13 Helping children to cycle forms a core part of the Mayor’s vision. This ambition covers infrastructure improvements to create safe routes to school but also providing children with the skills and knowledge they need to cycle well on London’s roads. The Vision makes a commitment to review how existing Bikeability funding is spent to ensure it is relevant to children’s real needs.
- 1.14 The Mayor’s goal is to achieve a four-fold increase in the number of daily cycle trips by 2026, equivalent to a five per cent mode share for cycling across all journeys. Helping today’s children to cycle could be integral to delivering this growth in the future.

Why does child cycling matter?

- 1.15 This section provides context on why more children cycling is an important focus for policy. Consideration of the benefits of child cycling tends to focus on the role that cycling can play in increasing levels of physical activity among children. There is a causal relationship between individuals' levels of physical activity and all-cause mortality (Department of Health, 2011).
- 1.16 Inchley and Cuthbert (2007) summarised the benefits of child cycling in their research into active travel during the transition between primary and secondary school. Cycling (and walking) can be seen as effective and cost efficient means of increasing physical activity among children. They showed that those who walked or cycled to school were more active during the rest of the week than those taken to school by car.
- 1.17 Garrard et al. (2012) provided a comprehensive review of the benefits of cycling, although their review is not limited to child cycling. Their review centred on evidence for the health benefits of cycling, which included:
- Inverse associations between levels of active commuting and body mass index, blood fatty acid and cholesterol levels, blood pressure and incidence of diabetes
 - Association between general good health and less chronic illness among those who cycled regularly in a German study
 - Association between cycling, as a physical activity, and the treatment and prevention of mental health conditions, improved cognitive functioning and emotional well-being
- 1.18 Garrard et al. (2012) also considered cycling's potential role in improving local air quality, reducing noise pollution and reducing greenhouse gas emissions. Their consideration of the evidence for these focuses on reductions in motor vehicle use that would result from increased uptake of cycling. While their work provided quantified benefits that would result from a fall in motor vehicle use, the precise link to increased cycling was relatively speculative.
- 1.19 Garrard (2009) summarised the health benefits to children of a mode shift to active travel:
- Increasing levels of physical activity
 - Helping children to maintain healthy weight
 - Reducing injury from motor vehicle crashes
 - Reducing inequalities in children's health
- 1.20 Smith et al. (2012) explored the extent to which a change to walking or cycling for the journey to school is associated with a change in children's overall levels of physical activity. Their work highlighted the complexities of the association between active travel to school and physical activity. In their study of 9-10 year olds, those who changed to walking or cycling increased their total amount of time spent on physical activity i.e. physical activity as separate to the journey to school. Children who did not change or changed to car or public transport actually decreased the amount of time spent on physical activity during the study. The study also emphasised that the link is an association only and that researchers are still inconclusive about causal pathways. For example, it may be that children who are more physically active generally are more likely to choose to walk or cycle to school than their less active peers.

The link between child cycling and cycling as adults

- 1.21 While there is much in the literature on the health outcomes associated with cycling, it is the transport outcomes that are of particular interest to transport authorities. This review has not found papers that substantiate or disprove directly the theory that children who cycle become

adults who cycle, although there is some research on both physical activity and cycling that may serve as proxies for the theory.

- 1.22 A key finding of the work by Cardon et al. (2012) into cycling to school among Belgian children was that cycling to school at age 10 strongly tracks cycling to school at age 16. Almost three quarters of children cycling to school at age 10 were still cycling to school aged 16. The study suggests that when cycling is a child's main mode for travelling to school in the early years of secondary school this will continue throughout a child's teenage years.
- 1.23 The literature does suggest a correlation between physical activity as children and physical activity as adults. Telema et al. (2005) showed through a 21 year tracking study that a high level of physical activity among 9-18 year olds significantly predicted a high level of physical activity as adults. They concluded that school-age physical activity appears to influence adult physical activity and Shaw et al. (2013) reported that a person's physical activity levels are set early in life.
- 1.24 De Bruijn et al. (2009) showed that habit strength is an important factor determining cycle use among adults. Adult cyclists who had a strong cycling habit made less-conscious decisions to cycle compared with those who had weaker cycling habits. This could suggest that cycling as children helps to form a cycling habit that strengthens with age if cycling is continued, increasing the likelihood that individuals will cycle as adults.

2 Children and Cycling

2.1 This chapter sets out current evidence about levels of cycling by children and how these have changed over time. There have been relatively few formal studies concerning the range and extent of children's cycling. Data from various sources show a low level of cycling for journeys to school, a characteristic that has remained broadly static in recent years but constitutes a more considerable decline since the 1970s. The casualty data among child cyclists shows a marked decline in the numbers of children killed or seriously injured while cycling.

Past and present trends in children cycling

2.2 Published research and statistics do not usually take account of children's recreational and social cycling that takes place in and around where they live. There is more published data about children and cycling for transport, however, these journeys are usually confined to the journey to school (McDonald, 2012). It is likely therefore that the available data about child cycling underestimates the true level of cycling among children. For example, IPSOS Mori (2010) research found the increase in cycling after Bikeability training was considerably more for cycling journeys with friends and to visit the shops than cycling to school.

2.3 Steer Davies Gleave (2012a) examined cycling to school data from annual school census records for England excluding London for the five years to 2010/11. In this time period, the proportion of children cycling to school has remained fairly constant, ranging between 2.0 per cent and 2.1 per cent each year with no overall increase or decrease in the course of the five years. Within these overall figures, there has been a slight decrease in the proportion of children aged 5-10 years cycling and a very slight increase in cycling among children aged 11-15 years. The data also shows that in London, there has been a 0.1 percentage point decrease in children cycling to school over the five years. It is important to recognise certain limitations with the data gathered through the annual school census. For example, the census surveys are typically undertaken in the winter months when cycling may be less appealing because of poor weather and dark mornings and evenings. The surveys also focus on 'usual mode of travel' and therefore potentially underestimate the proportion of all school journeys made by bicycle.

2.4 Thornthwaite (2009) reported similar but slightly more fluctuating figures for levels of cycling to school in England and Wales. Between 1995 and 2000, cycling to school among 11-16 year olds was static at 2.0 per cent, rose to 2.5 per cent in 2002 and dipped to 1.9 per cent in 2005,

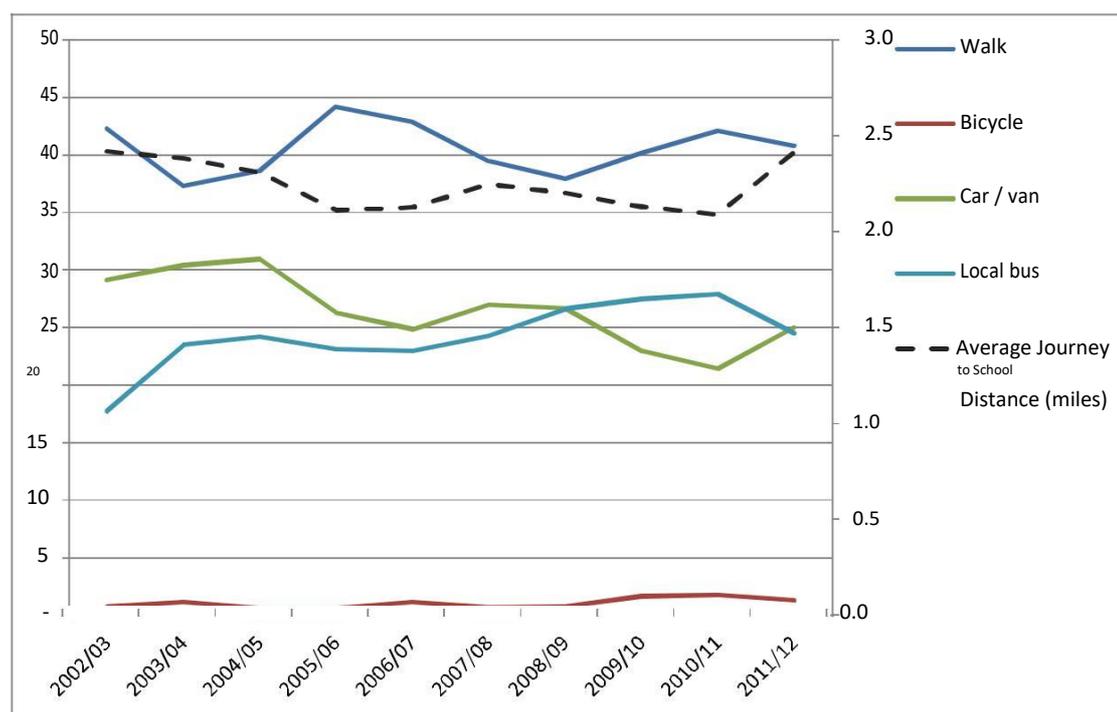
then rose again to 3.3 per cent in 2006. Girls are less likely to cycle to school than boys, particularly at secondary age, a correlation that has been statistically corroborated in other research (Benson and Scriven, 2012; McMillan, 2006).

- 2.5 Gill (2005) reported data showing a 41 per cent fall in the average number of miles cycled by children between 1975/76 and 1993/95 in the UK. While these data are old and corresponding data for the years from 1995 to present are not available, it is indicative of a downward trend in cycling among children since the 1970s.
- 2.6 Figure 2.1 presents National Travel Survey¹ data (DfT, 2013b) for the London boroughs and shows how mode split and average trip length for the journey to school has varied over the last ten years². The mode share of cycling has remained static, ranging between 1 and 2 per cent over the period. Car use has declined over the period despite a rise of four percentage points between 2010/11 and 2011/12. Bus use has increased over the period with the largest increase happening between 2002/03 and 2003/04 and a decrease of three percentage points between 2010/11 and 2011/12. Walking has the highest mode share with an average of 41 per cent over the ten years.
- 2.7 Figure 2.1 shows the average journey to school distance was the same in 2011/12 as in 2002/03, masking a slight downward trend to 2010/11 and a small rise between 2005/06 and 2007/08. The mode share of walking appears to mirror changes in average journey to school distance.

¹ Data collected is for all journeys made by all members of a household in one week.

² For clarity of presentation 'private bus', 'surface rail' and 'other transport' are not displayed on the chart as these modes accounted for a very small proportion of journeys to school. Walking is shown on the graph as this an active mode and accounts for the highest proportion of trips by a single mode. Car/van and local bus are also included as these both have a substantial mode share and trends in the use of both are of interest to transport policy makers.

Figure 2.1: MODE SPLIT AND AVERAGE TRIP LENGTH FOR THE JOURNEY TO SCHOOL AMONG 5-16 YEAR OLDS IN THE LONDON BOROUGHES 2002/03 TO 2011/12



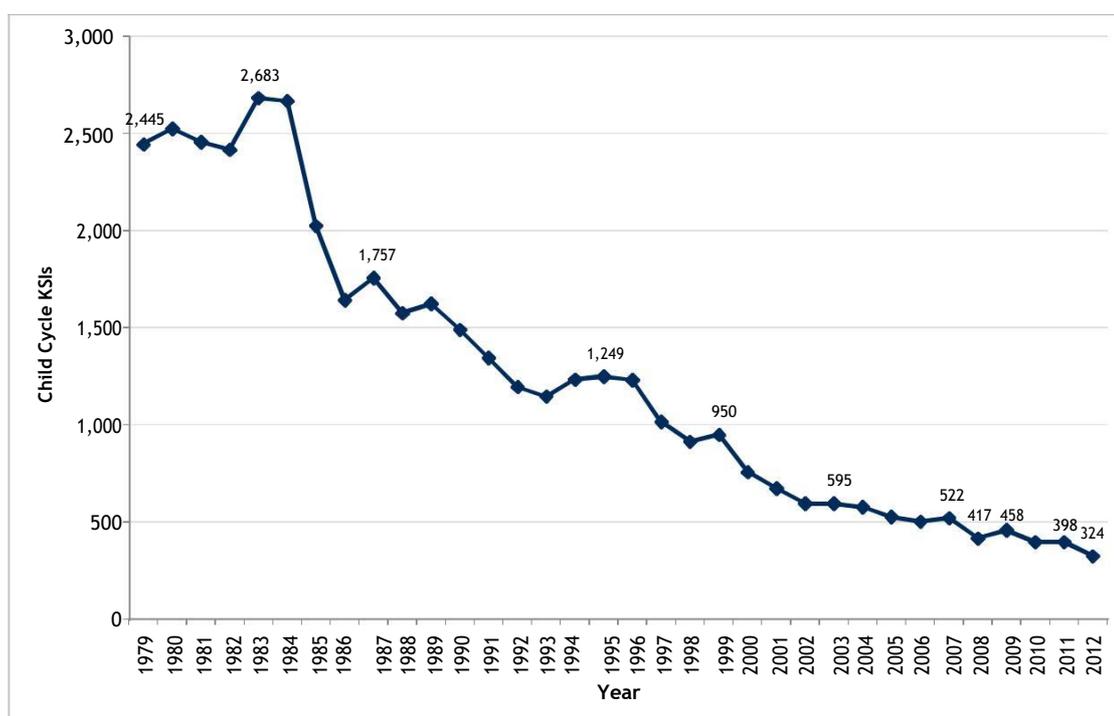
Children’s independent mobility

- 2.8 There is a wide literature on children’s independent mobility that develops interesting ideas about trust and surveillance among children, parents and wider society. A full review of the work in this field is beyond the immediate scope of this report, however, it is worth some consideration as it has a bearing on child travel to school and may help to explain trends in the level of cycling among children.
- 2.9 In their extensive paper on children’s independent mobility, Shaw et al. (2013) considered six ‘licences’ that are granted by parents to children – crossing main roads alone, travelling to places other than school alone on foot, travelling home from school alone, going out alone after dark, cycling on main roads alone and using local buses alone. Responses to surveys among parents and children were used to track changes in the granting of these licences at three intervals over a 40 year period – 1971, 1990 and 2010. Unfortunately for this report, data relating to the ‘cycling on main roads alone’ licence was only available for 2010. While it is not therefore possible to see changes in the number of children being granted this type of licence, the trend among the other licences for which there is data was for a large reduction in independent mobility among primary age children between 1971 and 2010. There was a slightly less clear trend in changes between 1990 and 2010. The research found that a greater proportion of children were accompanied for the journey to school in 2010 compared to 1990, although parents in 2010 reported being less concerned about the risk of their child being injured in a traffic accident than did parents in 1990. As Shaw et al. (2013, p.189) conclude, “independent mobility is important because of the impact it can have on increased levels of children’s physical activity, sociability and the acquisition of skills through active engagement and exploration in their local environment”.
- 2.10 Higher levels of independent mobility were related to more cycling to school in research by Ducheyne et al. (2012).

Cycling safety among children

- 2.11 Department for Transport statistics (DfT, 2013c) show that 324 children were killed or seriously injured while cycling in 2012 in England and Wales, the lowest for thirty years and a continuation of the general downwards trend in numbers killed or seriously injured since 1979 (Figure 2.2). Even in the context of fewer miles cycled, these figures illustrate a decline in the rate of serious cycling incidents among children.
- 2.12 Thornthwaite (2009) presented data showing that in the UK in 2007 three children were killed while cycling on the journey to or from school specifically. This compares with three killed while being driven and 10 killed while walking to school. Figure 2.2 shows that in 2007 522 children were killed or seriously injured while cycling thus it can be seen that the journey to school accounts for much less than 1 per cent of cycling related deaths or serious injuries among children.

Figure 2.2: ANNUAL NUMBER OF CHILDREN KILLED OR SERIOUSLY INJURED WHILE CYCLING



- 2.13 It should be recognised that a decline in the numbers killed or seriously injured is only part of the picture and does not necessarily mean that safety in the broadest sense has improved. As Hillman et al. (1990, p.4) noted, “road accident statistics are a very bad, and often misleading, measure of safety or danger. Where danger is perceived the perception is acted upon [and the area or activity is avoided]”. Therefore the reduction in the numbers killed or seriously injured could equally be explained by an increase in the perception of danger among parents and children and the avoidance of perceived dangers, as by a reduction in actual danger.

3 Understanding the Barriers to Child Cycling

- 3.1 In this chapter the attitudes, motivators and barriers to child cycling are considered. The review considers barriers to all forms of cycling by children in addition to the journey to school.
- 3.2 Ultimately, conclusions about the barriers to cycling to school get little more sophisticated than common sense ideas about why children do or do not cycle. In most cases parents dictate, or at least have a veto, on how their children travel to school and concerns about road danger prevents parents from allowing their children to cycle. This takes place within a culture of car ownership and use that likely compounds real and perceived road danger and reinforces the idea that roads are for motor vehicles.

Attitudes and motivators for child cycling

- 3.3 Attitudes to travel as a whole have been found to vary by age among children. Research by the Scottish Executive (2003) described three phases in children's perceptions of transport. Among the youngest children, the fun aspects of transport are most important. Older children and young teenagers value the independence offered by non-car modes, while older teenagers and young adults tend to aspire to car ownership and use.
- 3.4 Cycling has four main attractions for children – it is fun, it expands their 'territory', it's a social activity and allows for interaction with people and environment (Gill, 2005). Research by Benson and Scriven (2012) among pupils and parents of children aged 11-14 in southeast England found that for adolescents, having a friend who cycles to school is a significant predictor of whether a pupil cycles to school. These factors are primarily social in comparison to the motivators for adults, which are primarily based on fitness and cost (TfL, 2012b).
- 3.5 The attractiveness of the transport environment, safety and security, enjoyment, low physiological effort and cycling among friends are positively correlated with cycling. Among older children, students whose friends cycled to school were twice as likely to cycle to school themselves (Titze et al., 2007).

- 3.6 Interestingly, analysis by Lorenc et al. (2008) showed that children had far more positive views about cycling to school and were generally more open-minded about transport choices in comparison to adults. Children were also shown to be particularly receptive to messaging about the environmental, health and social benefits of walking and cycling. In this study children emerged as responsible transport users whose behaviours are tempered by parents responding to social norms about car use, maintaining the safety of their children and the state of the local environment.

Barriers to child cycling

Adult concerns about road danger

- 3.7 Perhaps the most commonly occurring theme in the barriers literature is parental road safety concerns (for example Loitz and Spencer-Cavaliere, 2013; Benson and Scriven, 2012; Sustans, 2011; and Atkins, 2010) although the degree of influence of this factor varies across different sources. There is a general view that cycling (and walking) exposes children to hostile surroundings and that parents must act to protect their children from these dangers. Hillman et al. (1990) noted that safety concerns among school staff are also a significant factor.
- 3.8 The literature suggests that concerns about danger are as much informed by perceived danger as by quantifiable or specific issues. Gill provides a useful insight into the role of perceived danger:

“Another reason for the perception that cycling is unsafe could be that cycling is an activity that has the potential to induce feelings of danger in many people even if they are comparatively safe. Low adult cycling participation rates mean that many adults probably feel nervous and unconfident about even the physical act of cycling, a state of mind which is likely to heighten their fear of other dangers. Cycling feels dangerous partly because it involves speed and skill: unlike walking, cycling does not come naturally, and learning to cycle involves significant risk of accidents and injuries. Moreover in road environments, cycling puts riders in close proximity to motor vehicles, which are obvious hazards and may feel especially threatening to inexperienced cyclists (that is, the overwhelming majority of the adult UK population).”

(Gill, 2005, p.29)

Parental obligations

- 3.9 Both children and parents identified the pressure on parents to conform with social norms around managing the safety of their children. The literature suggests there is a trade-off in parents' minds between ensuring children's safety and enabling independent travel (Lorenc et al., 2008). While parents may want to let their children travel independently, they must be seen to conform with social norms and do not want to be seen as acting irresponsibly by letting their child cycle.

Mode choice decision makers

- 3.10 Benson and Scriven (2012) examined the link between who makes the decision about cycling to school (parent or child) and cycling to school. In their research among children aged 11-14, half of children cycled to school when the decision to do so was left with the child; where only the parent decided, no children cycled to school.

Distance to school

- 3.11 Research by Ducheyne et al. (2012) showed distance to school is one of the most significant predictors of whether children will travel to school using active modes. The research, undertaken in Australia, found that when distance from school increased from 750m to 1.5km the proportion of children walking or cycling to school every day fell by a third. In a review of travel to school among school children in Amsterdam, Ligtermoet (2010) concluded that children living within 700m of school were most likely to walk. Those living further from school were more likely to use their bikes, but above 1.5km children will use other modes of transport. By comparison, the latest National Travel Survey data (DfT, 2013b) for 33 London boroughs shows that the average (mean) journey to school distance among 5-10 year olds is 2.7km and among 11-16 years olds 5.1km. It should be recognised that these are mean distances and consideration of the median is also important (but currently unpublished). The mean distances may be skewed by a relatively small number of children travelling a very long way to school.

Logistics, parental routine and lifestyle

- 3.12 Mode choice for the journey to school may also be determined by family routines and the need to fit together various parent and child journeys, for example parental journeys to work and child journeys to different schools. Parents may drive children to school as part of their own drive to work (Atkins, 2010). Research by Trapp et al. (2011) concluded that parents generally perceive driving their child to school to be more convenient than walking and cycling and this perception of convenience significantly reduced the likelihood of children cycling.

Culture of car use

- 3.13 The literature also discusses the role of the UK's wider 'car culture' in determining mode choice for the journey to school, including car centric family life, the perceived convenience of the car and simple force of habit (Loitz and Spencer-Cavaliere, 2013). This attitude is strongest among parents and older children, but is also present in children of a younger age. Car use is seen as central to a normal adult lifestyle, more convenient than other modes and is associated with high status (Lorenc et al., 2008). As discussed above, car ownership and use is something that older teenagers aspire to in particular.

Demographics

- 3.14 In London, children in households without cars cycled less than those in car-owning households. This is likely to be dependent on the areas lived in, as in inner city areas where car ownership is lower also have low levels of cycling by children. This may be a product of household income, which is negatively associated with bicycle ownership (TfL, 2008).

Child attitudes

- 3.15 Research has found that some children aged over 11 years have concerns about their level of physical fitness, lack of time for and interest in exercise (Benson and Scriven, 2012). They may also feel self-conscious about undertaking physical activity with cycling perceived as a 'marginal activity' – something done by others or those with a sporty attitude and specialist equipment (Mott MacDonald, 2012). Mott MacDonald (2012) also reported that girls are inclined to feel that cycling to school is unfashionable and that they have unsuitable clothing; both girls and boys are concerned about the image of cycling and cycle equipment.

- 3.16 Perhaps surprisingly, the perceived level of road safety was found to be negatively correlated with cycling among students. Researchers found that those who perceived a high level of traffic safety along their route were less likely to cycle regularly. This apparent paradox may reflect the fact that participants in the research who cycled had more awareness of the traffic dangers on their route than those who did not cycle (Titze et al., 2007).
- 3.17 A paper by Fotel and Thomsen (2004) discussed the slightly contrary view that children are active in what the authors call their own 'automobilization', manipulating events to ensure they can travel by car, for example timing their travel around a lift to school even if that meant leaving earlier. This could be both a factor of 'car culture' and children's own concerns about fitness (i.e. their perceived lack of fitness and therefore an inability to cycle), image and convenience.

Terrain, weather and light levels

- 3.18 The child cycling literature does not say much about the role of these factors but is generally consistent with the wider literature on barriers and motivators to cycling, for example, research on general cycle route choice suggests cyclists will favour longer, flatter routes over shorter, steeper ones (Krenn et al., 2014). Loitz and Spencer-Cavaliere (2013) identified poor weather and low light levels as significant barriers to walking and cycling to school in their survey of practitioners. However, in Benson and Scriven's (2012) study, no relationship between terrain, weather and light levels and level of cycling to school.

Cycle ownership

- 3.19 It is unclear from the literature whether cycle ownership is a significant barrier to child cycling, aside from the obvious fact that a child cannot ride a bike to which they don't have access. Tfl (2008) reported evidence that 80 per cent of children own a bicycle suggesting other factors then determine whether bicycles are used.

The impact of free bus travel for young people on cycling

- 3.20 Research by Edwards et al. (2013) concluded that the introduction of free bus travel for young people in London in 2005 has had little impact overall on active travel and has helped to shift journeys from car to public transport. Although the proportion of short journeys walked decreased slightly the total miles walked remained the same. A reduction in the number of car journeys was found suggesting free bus travel has had a positive impact on children's independent mobility.
- 3.21 The researchers highlighted that cycling levels were starting from a low baseline with the mean distance cycled per day being just 0.1km, and the proportion of short trips by bicycle being three per cent before free bus travel was introduced. In this context, the researchers found a small and not statistically significant decrease in both the number and distance of cycle trips made by young people. It is therefore conceivable that the free bus travel scheme may be limiting growth in cycling among children even if it has had a negligible impact on the level of cycling to school so far (Edwards et al., 2013).

Addressing the barriers to child cycling

Summary of barriers

- 3.22 The barriers to child cycling discussed above reduce to four overarching barriers:

- Road danger – concerns about road danger among parents, school staff and to an extent children.
- Attitudes – car culture and aspirations towards car ownership and use. The pressure on parents to conform with social norms. Parents’ fear of being (or being seen to be) irresponsible if they let their child cycle to school, exposing them to danger. A reluctance among some children particularly girls to cycle because of concerns about their own image a negative perception of cycling versus other modes.
- Convenience – cycling as an inconvenient mode of transport for parents. It may be less hassle for parents to walk with their children to school, rather than get the children’s bikes out. Parents who are themselves driving to work anyway may want to link the journey to school with the journey to work, dropping off their child on the way. For children, it is less convenient than being driven door to door.
- Distance – the literature suggests distances of between 0.7km and 1.5km from school are most conducive to cycling.

Overcoming the barriers

- 3.23 It is not clear from the literature the extent to which the various barriers interact with each other. The key issue in considering how barriers might be overcome is the need to understand the relative importance of the various barriers, as this will help to determine where to focus efforts and the types of solutions that may be most appropriate.
- 3.24 A mix of interventions will be required to overcome the barriers to children cycling, which should include infrastructure and behaviour change measures. The literature highlights the need to tackle parental fears of road danger and change the built environment to create safe spaces for cycling. Safe routes to school need to be provided and parents need to perceive there to be a safe route to school.
- 3.25 A study by Lorenc et al., (2008) concluded there is public support for infrastructure measures that address public views about safety of the local environment. The literature also finds that people will generally use good quality cycling infrastructure if it is provided. Stated and revealed preference studies show cyclists are prepared to travel further to reach or use safe cycling routes (for example Hood et al., 2011 and Tilahun et al., 2007). Data collected by TfL shows that cycling on roads forming part of the pilot Cycle Superhighways increased by up to 100 per cent at peak times (TfL, 2011).
- 3.26 Behavioural measures should take public views into account, particularly the perception of cycling being a dangerous activity. However, a balance should be struck because emphasising the safety of walking and cycling has the potential to draw unnecessary attention or place undue emphasis on the risks involved (Lorenc et al., 2008).
- 3.27 Among parents who drive their children to school the provision of safe routes may not in itself be enough to discourage driving to school. TfL (2008) reported that just two per cent of respondents who drove their child to school considered cycling and the provision of adequate cycle routes as a means of encouraging them not to drive their children to school. This illustrates the need to address perceptions of cycling, particularly among adults, in addition to the provision of infrastructure.
- 3.28 Addressing these barriers poses significant challenges. Reducing actual and perceived road danger may be relatively easy in comparison to the changes that would be needed to reduce journey to school distances, especially in these times of pressure on school places and emphasis on family choice of school.

3.29 Another consideration is whether changes to the legal framework that applies in the case of road collisions would indirectly encourage higher levels of cycling. In the UK there have been calls for changes to the law to enable a system of stricter liability to operate in collisions involving pedestrians, cyclists and motor vehicles (The Times, 2013a and 2013b). A system of strict liability (which requires motorists to prove they were not at fault, rather than the current system which requires pedestrians and cyclists to prove the motorist was at fault) such as that in place across most of Europe and New Zealand and Australia is held by campaigners to be one of the cornerstones of high levels of cycling in countries such as the Netherlands and Germany. There is little research evidence to support or disprove the theory, perhaps a result of the concept only recently becoming seen in the UK as an essential component of a cycling society. There is debate among cycling bloggers on the extent to which strict liability laws result in more cycling. For example, Davies (2013) reviewed an article posted on a Dutch cycling blog, discussing how strict liability operates in the Netherlands. Davies highlighted that total strict liability only applies in collisions involving children under the age of 14³ and could even then be overturned if the rider was proven to be cycling recklessly. In the UK politicians have so far avoided the introduction of strict liability as it is a contentious issue (Bikehub, 2011) with unclear evidence on its effectiveness (The Times, 2013a).

³ Although the link between this factor and the high level of child cycling in the Netherlands is not considered in the article.

4 The Role of Cycle Training

- 4.1 This chapter considers the role of cycle training in getting more children cycling to school. The chapter starts with an overview of the amount of training that is delivered to children in London, benchmarking this against delivery elsewhere in England.
- 4.2 The evidence for the effectiveness of child cycle training is then reviewed. An initial answer to the question 'does cycle training work?' is that it depends on how its effectiveness is gauged. Effectiveness may include reduction in casualty rate, increased levels of cycling and improved cycling skill among target group(s). The majority of the research into the effectiveness of cycle training relies on self-reported changes in cycling frequency and confidence levels. Some research examines the relationship between cycle training and accident rates.

Levels of cycle training delivery

- 4.3 Figures collected by Transport for London show that in 2011/12 a total of 28,569 children participated in Bikeability cycle training at to Level 2 and 3,007 to Level 3 (TfL, 2013b). Level 2 training is most likely to have been delivered to children in the final two years of primary school (aged 9-11) and the majority of children trained at Level 3 will have been of secondary school age.
- 4.4 Across England, excluding London, DfT Bikeability grant funding (up to £40 per head) was used to deliver 293,360 places up to Level 2 in 2011/12 (DfT, 2013d). This figure accounts for places delivered using DfT funding therefore does not include all cycle training places delivered. Certain areas provide additional places paid for locally, although it is likely that DfT funded places do account for the majority of all training places delivered.

Child cycle training and safer cycling

- 4.5 The balance of evidence suggests there is a positive association between cycle training and safer cycling:
- Trained children may be three times less likely to become a casualty than those who have not been trained (RoSPA, 2001).

- Children were found to be less inclined towards risky behaviour. This was specifically attributable to the cycle training, rather than the possibility that the 'safest' children presented for training (Transport Research Laboratory, 1996).
- Approximately 90 per cent of child respondents said that their abilities to judge risk, signal to other road users and keep a safe distance from parked cars had improved a little or a lot following Bikeability training. A similar proportion of parents agreed that their child's abilities to judge risks and know their own ability had improved after Bikeability. It should be recognised that this does not necessarily mean that the children have a good or high standard after training as they could be improving on a low baseline level (Ipsos MORI, 2010).
- The majority of parents said that Bikeability had improved their child's safety on the road (93 per cent) and the majority of children said they felt more confident cycling on the road (86 per cent). Furthermore, 16 per cent and 17 per cent of children and parents respectively said they (or their child in the case of parents) cycled a lot more as a result of receiving Bikeability training (Ipsos MORI, 2010).
- Approximately 90 per cent of parent respondents said the training had improved their child's safety on the road Childwise (2011) and Steer Davies Gleave (2012b).
- In Merseyside almost all parent respondents (95 per cent) said they believed the training had improved their child's ability to cycle safely and their level of road safety generally even when not cycling (Mott MacDonald. 2009).

4.6 A study by Ducheyne et al. (2013) found cycle training to be equally effective (in terms of improved cycling skill) among boys and girls. The researchers concluded this was important given the difference in the pattern of development between boys and girls. The study also found no association between effectiveness and socio-economic status.

4.7 However, not all previous research has found evidence of a positive association:

- Half of parents and almost half the children (47 per cent) reported no increase in their level of cycling pre- and post- Bikeability (Ipsos MORI, 2010)
- Research into the old national cycling proficiency scheme⁴ in the London Borough of Bromley found no evidence that safer cycling behaviour among children resulted from the cycle training. Further, there was no evidence of safer attitudes among those who had been trained (Colwell and Culverwell, 2002).

Cycle training and more cycling

4.8 There is mixed evidence for an association between cycle training delivery and more cycling to school. This issue tends to be dealt with more in the grey literature published by government agencies and businesses. As noted previously, the grey literature is not usually subject to

⁴The national cycling proficiency scheme preceded the National Standard for cycle training and Bikeability. Cycling proficiency did not necessarily include an element of on-road cycle training. The National Standard for cycle training and Bikeability are a considerable development on the old cycling proficiency scheme and focus on preparing trainees for on-road journeys. The research by Colwell and Culverwell (2002) is therefore not directly relevant to considerations of the effectiveness of Bikeability but does give some insight on the effectiveness of other types of cycle training.

academic peer review and the organisations promoting the research may have more of an interest in identifying positive associations than researchers in academia⁵.

4.9 While it is not possible from the current literature to draw firm conclusions about causal links between cycle training and more cycling to school, there is research suggesting positive associations between cycle training and more cycling:

- Parent respondents to an evaluation of cycle training in Merseyside said their child's frequency of cycling had increased following the training, particularly for leisure purposes and a large proportion of respondents (87 per cent) said they were more willing to allow their child to go out cycling following the training. Cycle training was also seen to have resulted in positive perceptions of cycling among whole families, suggesting a link between child cycle training and a greater uptake of cycling by families thereafter. (Mott MacDonald, 2009).
- Evaluation of the Travelling to School Initiative found that schools participating in cycle training are more likely to experience an increase in cycling to school than those not participating in cycle training (Atkins 2010).
- Bikeability cycle training has been found to be positively correlated with higher levels of cycling to school. The correlation appears to be strongest on levels of cycling to secondary school. In Hertfordshire, the level of cycling to secondary schools was found to have increased over time in cases where all feeder primary schools received Bikeability cycle training, compared to a decrease in schools where no pupils at feeder primaries had been trained. However, it was not possible within the scope of the analysis to draw conclusions about causation (Steer Davies Gleave, 2012a).
- Among English local authorities outside London there is a positive association between a history of training delivery and children cycling to secondary school (Steer Davies Gleave, 2012a).
- There is also a correlation between the length of time a local authority has received central government funding for Bikeability and the proportion of children cycling to school (Steer Davies Gleave, 2012a).

4.10 There is no existing research that addresses the question of whether parents who have received cycle training are more likely to encourage their children to cycle. Some studies have noted the importance of parental support and encouragement in determining mode choice for the journey to school (Loitz and Spencer-Cavaliere, 2013, and Ducheyne et al., 2012). This suggests that parents who cycle or have a positive view of cycling are more likely to let their children cycle.

4.11 To give a further bearing on the link between cycle training and more cycling we have also reviewed the research into the effectiveness of adult cycle training, which also suggests that those undertaking cycle training cycle more after the training:

⁵Scriven (1975) provides a potted analysis of evaluation bias and how it may be controlled, recommending independence of evaluators from both programme sponsors and delivery teams. However, even where researchers are independent in this way, it may be more challenging to mitigate against so-called confirmation bias whereby people naturally favour evidence that aligns with their preconceptions or hypotheses. Nickerson (1998) discusses confirmation bias using examples from a number of fields including public policy and science.

- In Tower Hamlets, statistically significant increases in cycling frequency were reported among adult trainees after cycle training with the researchers concluding that people cycle more after training (Margolis, 2011; Johnson and Margolis, 2013).
- Survey research among adults across London who had received cycle training found that one in five cycled a lot more after training, although almost half cycled as much after training as before (Synovate, 2008).
- A study in Sydney found that 56 per cent of those who had participated in training said they cycled more when surveyed two months after completing the training. Training was also found to have significantly increased self-reported cycling skill and confidence (Telfer et al., 2006).
- A survey by London-based training provider Cycle Training UK found that 81 per cent of adult respondents felt they were more confident cyclists after training and that 99 per cent of those who cycled more or more confidently attributed this to the training (Cycle Training UK, 2004).

4.12 It should be noted that in the latter three studies above the base is low and associations between cycling levels and cycle training have not been proven statistically.

4.13 There is some evidence against that does not support a link between cycle training and the proportion of children cycling to school:

- Research among London boroughs did not find an association between the proportion of pupils receiving cycle training and the proportion of children cycling to school. The London Borough of Tower Hamlets trained approximately 50 per cent of year 5 and 6 pupils and had a cycling mode share for the journey to school of one per cent. By contrast, the London Borough of Ealing trained approximately 10 per cent of pupils and had a mode share of three per cent (Steer Davies Gleave, 2011). This highlights the importance of other factors such as socio-demographics in determining levels of cycling.
- Despite the largely positive findings in the Merseyside research these were not found to result in substantially more children cycling to school or being allowed to cycle to school – 80 per cent of respondents stated that their child never cycled to school. The main reasons given for this were “[journey distance] too long or too short to cycle’, ‘too much traffic’, and, the influence of linked trips where parent/guardian ‘drops off child on route somewhere else’”, which gives a useful bearing on the barriers to cycling that training can and cannot help to overcome (Mott MacDonald, 2009, p.4-3).

The effectiveness of different approaches to cycle training

4.14 Leaving aside whether effectiveness is measured in terms of better cycling or more cycling there is some consideration in the literature of the merits of different approaches to cycle training.

4.15 Research from Groningen showed child cycle training to be more effective (in terms of roadcraft) when children practised manoeuvres demonstrated by an adult, in comparison to an alternative method consisting of an indoor theory session followed by a practical session in which instructors corrected errors made by the children. Of note is the fact that the first method appeared to be adequate for teaching basic practical skills but not for roadcraft specifically and the second method was seen to have a negative impact on children’s behaviour on road. The researchers concluded that the children used their own rules and strategies for dealing with on road situations. Similar research following the same method

concluded that training should be centred on the children's own defensive rules rather than on formal rules (RoSPA, 2001). Theoretical training alone does not improve cycling skill.

- 4.16 Further research from Groningen showed that secondary school children who had the skills and knowledge to ride appropriately often did not because they questioned the relevance and usefulness of what they had been taught in playground-based training. The research concluded that practical training in normal traffic environments is essential (RoSPA, 2001).
- 4.17 In a review of the effectiveness of Lambeth Council's cycle training, Steer Davies Gleave (2008) concluded that Level 2 Bikeability training for children may not be sufficient to bring about more cycling to school. Over half of parents stated they would like their child to have more training. This suggests that Level 2 training is not in itself sufficient to overcome parental concerns about road safety but caution is needed with this conclusion. For instance it may be that parents would be more satisfied if their children had a longer exposure to Level 2 training or they may want their child to undertake training at Bikeability Level 3 to help them deal with London's busy roads. Involving parents in the delivery of training could help to break down the barrier of parental concern. Transport Scotland suggested involving parents as volunteers or even trained instructors. Identifying a member of school staff to lead on the implementation of cycle training within the school can further help encourage parents to take on responsibilities for coordination of training (Transport Scotland, 2011).
- 4.18 Macarthur et al. (1998) conducted a study to evaluate the effectiveness of the 'Kids CAN-BIKE' scheme, a playground-based cycle training programme for 8–13 year olds in Toronto, Canada. The programme consisted of 90 minutes of training at an instructor to trainee ratio of 1:6, covering basics such as helmet and clothing check, starting and stopping, signalling and shoulder checking – broadly comparable with Level 1 Bikeability. The study found no significant differences in cycling behaviour, knowledge or attitudes between those who had and those who had not participated in the training. One explanation for this emerging from the study was that the quantity of the training may not have been sufficient to effect change – the children needed longer to practise and assimilate the skills. Research by Ducheyne et al. (2013) found that the provision of three training sessions each lasting 45 minutes did improve children's cycling skills in the short term. These studies of playground-based training suggest that the duration of training may be an important factor in determining its effectiveness in developing skill among trainees. Ducheyne et al. (2013, p.45) also noted that training in a traffic-free environment is a useful starting point for safe cycling on-road because "the automation of cycling skills has been shown to ensure children focus more on environmental factors" i.e. they can focus more on anticipating and reacting to the conditions around them the less they focus consciously on the basics of controlling the bike.

Encouraging more cycling after cycle training

- 4.19 A survey (Steer Davies Gleave, 2013) among Bikeability training providers asked all respondents what would be most successful in getting more people cycling after taking part in Bikeability. Their suggestions included:
- Offering parents training, finding ways of parents to better understand what their children have been taught, or offering family training would help to get more people (children) cycling after taking part in Bikeability
 - Better / more cycling infrastructure would encourage more people to cycle after taking part
 - Having a led ride at the end of the training, and more local organised rides throughout the year would encourage more cycling beyond the training

- Promoting local cycle clubs and encouraging trainees to consider them would provide a clear route for progression and would encourage more cycling beyond the training
- Taking the opportunity to promote (and encourage trainees to seek) further training such as Level 3 could help to ensure more people cycle after receiving the training (by showing them how to develop their new skills)
- Additional ways in which more trainees could be helped and encouraged to cycle more after taking part in Bikeability were identified as follows:
 - Providing more information to trainees about route planning, and giving them information about local routes (e.g. maps) – five related comments.
 - Providing cycle maintenance courses
 - Having a form of cycle-challenge at the end of training, or promoting a discount or voucher scheme which incentivises more cycling
 - Providing refresher training

4.20 It is of course important to recognise that the above are suggestions made by cycle training providers and therefore reflect their views rather than empirical evidence on measures effective at getting more children cycling.

5 Summary and Priorities for Future Research

5.1 The existing literature helps to answer elements of the research questions listed at the start of this paper. This review has helped to highlight gaps in the current knowledge that require further research in the next stages of this research project in order to fully answer the research objectives.

5.2 Summary of key points relevant to the research questions:

- The recorded level of child cycling has declined since the 1970s and has remained static since the 1990s, fluctuating around 1-2 per cent of journeys to school.
- The social aspects of cycling appeal most to children, whereas the cost saving and health benefit potential appeal most to adults.
- The principal barriers to child cycling are concerns about road danger, parental car culture, aspirations for car ownership, image concerns among teenagers, perceived convenience of other modes and the distance between home and school.
- There is evidence that cycle training is associated with increased cycling skill and confidence and some evidence of a correlation between cycle training and increased frequency of cycling among those trained.
- Cycle training plays a role in positively influencing parental perceptions about the cycling skills and abilities of their children. This helps to allay parental fears about the safety of their children while cycling. However, concern about the safety of the environment in which children must cycle is likely remain a determining factor in parents' decisions to allow their children to cycle even if they believe their children's cycling skill has been improved by training.

Priorities for Future Research

5.3 This review has highlighted gaps in current knowledge that could be explored through further research including the quantitative and qualitative stages of the wider TfL research. These research priorities are:

- Explore whether cycle training for parents can help bring about more cycling among children and more widely, the effect of adult (parent) cyclists' behaviour on children
- Quantify the full extent of child cycling to enable a better understanding of the type of trips children make and the proportion of cycling time that is spent on utility cycling versus cycling for play
- Understand if cycle training has an effect on levels of leisure cycling, as well as cycling to school
- Understand the extent to which the barriers and motivators for child cycling vary by age, gender, socio-demographics and ethnicity
- Research the acceptable distance for cycling to school and how it varies between adults and children of different ages and the interaction with perceived safety of cycle routes

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