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Executive Summary

Bikeability Programme

Bikeability is the Government's national cycle training scheme designed to give people the skills and confidence to cycle safely and well in modern road conditions. Bikeability is underpinned by the National Standard for cycle training. The National Standard is built upon similar principles as training for motorcycle riders and car drivers, teaching the importance of assessing the likely risks faced by road users.

By March 2013, more than one million children had been trained. We have undertaken an economic evaluation of Bikeability based upon data such as the Ipsos MORI evaluation and research analysing school census and Bikeability delivery data. Our analysis adheres to the principles of Government guidance on economic appraisal as set out in the Treasury Green Book and the DfT's WebTAG guidance.

Economic Appraisal

While the economic analysis is based on established economic principles, it should be noted that the economic appraisal is innovative in its application to Bikeability, where the evidence base underpinning

impacts is more limited (than for say larger scale infrastructure projects).

As a result, the economic appraisal of Bikeability is, to a degree, exploratory in nature. In particular the behavioural responses and impacts associated with these are based on a limited evidence base, so 'best judgement' assumptions have been employed. We have sought to be consistent with the core principles of transport economic appraisal and set out the basis for our key assumptions. Sensitivity tests have been undertaken to assess the economic performance of the scheme under a range of assumptions.

Appraisal Results

We have undertaken an appraisal based on three appraisal periods – short term (three years, to reflect the initial response to the programme) and then medium (up to 10 years) and longer term (up to 30) to assess the impact of behaviour change persisting though the remainder of childhood and into adulthood respectively.

The results show that the economic performance of the scheme, based on the assumptions employed, would deliver a BCR of just over 3:1, 5:1 and 7:1 over these time periods.

We have undertaken a range of sensitivity and scenario tests that show the economic performance of the scheme remains strong under a range of tests.

Next Steps

We have identified a range of areas where additional research and insight would add value and support the overall robustness of the economic appraisal, and also of the wider monitoring and evaluation of the Bikeability programme, and safety training programmes in general.

1 Introduction

Bikeability Programme

1.1 Bikeability is the Government's national cycle training scheme designed to give people the skills and confidence to cycle safely and well in modern road conditions. Bikeability is underpinned by the National Standard for cycle training.

1.2 The programme was launched in 2006/07 and so far over one million children have been trained in England using central government grant funding.

1.3 The overall grant funding cost of the programme over the period to March 2014 is approximately £45.6m. Development and management costs are estimated to be around 10% of the funding figure in addition.

1.4 Steer Davies Gleave (SDG) is the Department for Transport's (DfT's) current Bikeability support services contractor and has worked with DfT on the programme since its launch.

Purpose of Economic Evaluation

1.5 Evaluation seeks to assess whether projects, policies and programmes have met their intended objectives and outcomes. The Bikeability programme has a range of objectives beyond those that can be fully captured within the economic analysis alone.

1.6 This report focuses on the economic evaluation of the programme and is intended to assess the economic impact and benefits of the Bikeability programme.

1.7 This report presents an update to the draft economic evaluation report prepared in July 2013, in light of comments received from the Department for Transport.

Report Structure

1.8 The report is structured as follows:

- Chapter 2 provides an Overview of the Bikeability Programme.
- Chapter 3 looks at the base cycle market and the impact of Bikeability on cycle demand.
- Chapter 4 describes the economic benefits of Bikeability, and how we have assessed and valued these.
- Chapter 5 presents the economic appraisal results.

1.9 The recommendations for further work are summarised in the Executive Summary and included as discussion areas within the main report.

2 Overview of Bikeability Programme

Bikeability Programme

2.1 Bikeability is the Government's national cycle training scheme designed to give people the skills and confidence to cycle safely and well in modern road conditions. Bikeability is underpinned by the National Standard for cycle training. The National Standard is built upon similar principles as training for motorcycle riders and car drivers, teaching the importance of assessing the likely risks faced by road users.

2.2 Bikeability is particularly useful to schools as it includes both road and bike safety as part of the training which are topics that can be covered in lessons at various key stages. It also presents an opportunity for the school to alleviate the problem of congestion during the school run by providing children with the skills and confidence required to cycle to school safely. This has the added benefit of providing the children with more opportunities for exercise which in turn helps to improve mental and physical well-being.

2.3 Bikeability and the National Standard comprise three levels:

- Level 1 teaches trainees basic bicycle control skills in an off-road environment;

- Level 2 is delivered on road, where trainees learn the basics of on road cycling, and
- Level 3 teaches trainees advanced on road cycling skills.

2.4 The majority of training is delivered to Year 5 and 6 primary school pupils (children aged 9-11). There is currently a much lower volume of training delivered to children in Year 7, the first year of secondary school.

2.5 Bikeability training is delivered free of charge or at low cost by the Local Highway Authority or School Games Organiser host school. DfT has provided funding for Bikeability child training places since the introduction of the scheme. Funding is provided at the rate of £40 per child, which must be used to deliver training up to Level 2. The total amount of funding provided by DfT has increased year on year but always as a contribution of £40 per pupil up to Level 2. This excludes any additional costs that local authorities and/or parents contribute towards the training costs. Within our assessment an additional 10% costs has been included to reflect DfT's management costs for the programme.

2.6 There are three National Standard levels with a series of outcomes for each that a trainee must demonstrate. There are core Bikeability award

materials (badge, certificate and booklet). The complete cycle training typically takes place over three years, although not all school children are expected to attend all levels of training.

Potential Benefits

2.7 In spring 2010 the DfT commissioned Ipsos MORI to carry out a research study into the impact and perceptions of cycle training, with a specific focus on Bikeability.

2.8 The results were encouraging, particularly in addressing the safety concerns of parents as children who have taken part in the Bikeability scheme feel safer and more confident when riding on the road (86%) and their parents feel more confident in allowing them to do so (87%).

2.9 Bikeability training itself is also rated very highly by both parents (97% say that they are very/quite satisfied with the training) and children (95% describe it as fairly/very good), and children who have taken part say that they would recommend it to friends (91%).

2.10 The economic benefits of Bikeability are based on changes in perception (increased confidence) and changes in behaviour (where this

increased confidence encourages more cycle usage).

The key benefits are:

- Benefits to new cyclists from:
- Reduced journey times (compared to former mode)
- Improved physical fitness - benefits to the individual
- Benefits to existing cycle users from improved safety - valued on the basis of a reduction in accident risk;
- Benefits to society from:
- Reduced congestion, accidents and emissions from modal shift from car;
- Health benefits - from reduced childhood obesity and, over the longer term, improved mental health and reduced risk of death from cardiovascular illness;
- Reduced travel for parents escorting children to school or other destinations;
- Absenteeism benefits - regular cyclists are shown to have fewer days off sick which is a direct productivity benefit to the employer / economy (as above).

2.11 Some of these benefits would only occur in the short-term during student life (e.g. reduced parent travel), and others during working life (e.g. absenteeism).

3 Impact on Cycle Demand

The Base Market for Cycling

3.1 The first step of quantifying the benefits of Bikeability is to establish the base market of cycling.

3.2 Our previous report was informed by the National Travel Survey, 2011, alongside bespoke Bikeability research:

- Cycling to School Report, Steer Davies Gleave on behalf of DfT, 2012
- Research to Explore Perceptions and Experiences of Bikeability Training Amongst Parents and Children (Bikeability Perceptions and Experiences Report), Ipsos MORI, 2010

3.3 As part of this update we have looked at the latest 2013 NTS report, which includes recent data of school cycle mode shares and the total number of cycle trips by age category.

Cycle to School Mode Share (National Travel Survey)

3.4 Table 3.1 sets out the main modes of travel for 11 to 16-year olds from the 2013 National Travel Survey (NTS).

3.5 It shows that cycle mode shares vary over the last six years between 1.5% of trips (in 2013) to 3.5%

in 2011, with an average over the period 2008-13 of 2.6%.

3.6 Applying this percentage to an average of 190 school days a year (the statutory minimum), this suggests that the average child make between 6 and 13 single cycle trips per year (i.e. both to and from school).

Table 3-1 NTS Travel to School Mode Shares, 11-16 year olds.

Main mode	2008	2009	2010	2011	2012	2013	Avg
Walk	39%	39%	36%	38%	37%	37%	37.8%
Bicycle	2.7%	3.5%	2.1%	3.5%	2.3%	1.5%	2.6%
Car / van	22%	22%	25%	22%	27%	23%	23.5%
Private bus	11%	8%	7%	8%	6%	8%	8.0%
Local bus	22%	24%	26%	24%	23%	26%	24.2%
Surface rail	1%	2%	2%	1%	2%	2%	1.7%
Other transport	1%	2%	3%	2%	3%	3%	2.3%
All modes	100%	100%	100%	100%	100%	100%	100.0%

3.7 The figures are highly variable year to year, and an average would seem to be the most appropriate percentage to take. We have therefore assumed the 2.6% cycle mode share for our analysis¹.

Cycling to School Report

3.8 The Cycling to School Report suggested that the cycling to school mode shares for the surveyed Hertfordshire secondary schools (sample of 10) in recent years range between 1.8% and 2.7% for those who received no Bikeability training. These mode shares are broadly in line with the NTS findings, notwithstanding the small sample of schools in this study.

Other (Non-School) Trips

3.9 To establish the overall base market for cycling we also need to understand the number of other cycling trips made.

3.10 We have looked at two sources for this, with the purpose in deriving a 'factor' to uplift school trips by to reflect the overall number of cycle trips made.

¹ Note - previous analysis had a higher figure of 3.2%

Bikeability Perception and Experience Report

3.11 The Bikeability Perception and Experience Report contained trip rate surveys of parents and children in the summer and the winter.

3.12 Table 2.4 sets out the children’s cycling journey purposes. We have made an assumption of the assumed journeys per week by purpose has been specifically set such that the total number of return trips per week is the same as in Table 3-2.

Table 3-2 Children’s Survey of Cycling Purposes

Purpose	Children’s responses to cycling purpose	SDG assumed journeys per week by purpose	Return Trips per week
Playing	62%	1	0.6
To/from friends house	41%	1	0.4
To/from shops	19%	1	0.2
Bike ride with family	19%	0.5	0.1
To/from family's house	16%	0.5	0.1
To/from school	15%	3.0	0.5
Other	7%	0.5	0.0
Total			1.9

Purpose	Children’s responses to cycling purpose	SDG assumed journeys per week by purpose	Return Trips per week
Ratio of School to All trips			4.2 (0.5/1.9)

2.11 This analysis suggests that the implied multiple of 4 should be applied to school trips to obtain the overall size of the base cycling market.

Range Estimate for Base Market

3.13 There is a degree of uncertainty around both the cycle travel to school mode share, and the factor that should be used to uplift school trips to obtain an overall number ‘all purpose’ of base cycle trip.

3.14 This is presented in Table 3-3.

Table 3-3 - Base Cycle Demand - Range Estimates

	Low	High	Central	Comment
a. Cycle mode share - Travel to School	1.50%	3.50%	2.6%	Average of 2008-13
b. School days p.a.	190	190	190	Statutory minimum

	Low	High	Central	Comment
c. Implied school trips p.a. per child	5.7	13.3	10.0	(a * b)
d. Ratio of Non-School to School trips	3	5	4	SDG estimate
e. Total cycle tips per annum	17	67	40	(c * d)

3.15 We have used a central case estimate of 40 trips per child per year in this assessment and have undertaken sensitivities at higher and lower levels of based demand.

3.16 The ‘high’ and ‘low’ estimates each represent the cumulative effect of the two individual high and low assumptions (mode share, and all trip purpose factor). Our sensitivity is based on a +/- 50% around the central case.

Impact of the Bikeability Scheme

Increase in Usage

3.17 The impacts the Bikeability Scheme was measured in the following two reports:

- Cycling to School Report, Steer Davies Gleave on behalf of DfT, 2012

- Research to Explore Perceptions and Experiences of Bikeability Training Amongst Parents and Children (Bikeability Perceptions and Experiences Report), Ipsos MORI, 2010

Cycling to School Report

3.18 Table 2.5 shows the proportion of the secondary school children in Hertfordshire cycling to school by whether or not the school had Bikeability training in their feeder schools.

Table 3-4 Mode Share of Cycling To Hertfordshire Schools

Level of training	Mode Share 2007-2010 Average	Change in Cycling With Bikeability	Number of schools
No Bikeability training	2.3%		10
2 years Bikeability training	3.4%	45%	32
2009-10 Bikeability training only	3.4%	46%	49
2008-09 Bikeability training only	3.5%	48%	42

3.19 The results show that children who experienced Bikeability training are consistently delivering higher cycle to school mode shares. The number of children who cycle to school and took part in Bikeability was 45%-48% higher than those children without Bikeability training.

3.20 In the Bikeability Perceptions and Experiences Report, parents and children were asked how Bikeability changed their frequency of cycling changed due to Bikeability. Table 3-5 shows that 50% of parents and children reported that they cycled a little or much more.

Table 3-5 Impact On Cycling Frequency Due To Bikeability

Change in Frequency of Cycling due to Bikeability	Averaged Parent and Children's response
Much more	17%
A little more	33%
Same	49%
Less	1%
Don't know	2%
Total	100%

3.21 We have used an uplift factor of 45% based on the Hertfordshire evaluation evidence.

Summary of Key Demand Inputs

3.22 There are two key assumptions that underpin the development of the central scenario for business case. These are:

- A base market for cycle trips of 40 single cycle trips per annum² made by the average child per annum.
- An increase in cycle trips of 45% as a result of Bikeability.

² Our previous analysis used a figure of 47 trips. The 45% increase from Bikeability is the same as used on the previous work

Discussion – Research Recommendation

More Bikeability Evaluation

3.23 To examine:

- Base cycle to school mode share
- Total cycle journeys by purpose
- Impact of Bikeability on demand for all trip purposes

3.24 Bespoke analysis (i.e. of Bikeability schools) would allow for ‘before and after’ survey to be undertaken (linked to next assumption).

3.25 There may also be scope to review or interrogate existing travel diary or Personalised Travel Planning information (PTP), e.g. in areas delivering PTP as part of their Local Sustainable Transport Fund programme, to get an understanding of existing trips. This could offer a larger sample better, so ideally would need to be drawn from areas where the same approach to delivery and data capture was employed.

3.26 Recommendation – Consider above

³ Ipsos MORI for DfT, 2010, Research to Explore Perceptions and Experiences of Bikeability Training Among Parents and Children

Demand Response

3.27 Sources³ suggest increase in usage of 50% from a (low) base, however, these are unreliable due to the small sample size. Travel diary analysis (before and after) would provide a rich evidence base, but probably also draw from a small sample and be relatively expensive.

3.28 A lower cost alternative would be to include a basic questionnaire to all Bikeability participants to record ‘current’ usage with a follow-up questionnaire (perhaps an e-questionnaire) at a point or at a number of points after the programme. This would provide a larger sample.

3.29 Recommendation – Consider above

Steer Davies Gleave for DfT, 2012, Cycling to School: A Review of School Census and Bikeability Delivery Data

4 Economic Benefits

Benefits to Users (Bikeability Cycle Trips)

New Cyclists

4.1 The evidence suggests that Bikeability results in an increase in cycle usage of around 45%. Economic theory tells us that people change behaviour due to fact that they perceive a benefit in doing so, and that this benefit can be 'valued' as a welfare benefit to the new user.

4.2 For a 'conventional' transport scheme benefits can, and often are, measured through an elasticity approach by looking at the current demand (e.g. for a journey between A and B), identifying the benefit from a scheme (e.g. reducing the journey time from 15 to ten minutes) and using an elasticity (which tells us how responsive people are to a change in journey time) to forecast the change in demand.

4.3 For Bikeability we have estimated, or inferred, the benefits by looking at the observed change in demand from the scheme and employing reasonable assumptions on the average cycle journey time (generalised cost) and an assumed elasticity.

4.4 In this example:

- The change in demand is 45%

- We assume the average generalised cost of cycling to be 20 generalised for children and 30 minutes for adults.
- We assume a generalised cost elasticity of -0.9 .

4.5 By re-working the 'standard' elasticity equation the results suggest that, in order to elicit a demand response of 45%, the perceived benefit to the average new user will equivalent to up to 6.8 generalised minutes for children and 10.1 minutes for adults.

4.6 In estimating benefits to 'new' users, economic convention is that the 'rule of a half' is applied. This reflects the fact that the change benefit to the individual ranges somewhere between zero and 6.8 generalised minutes for children and 10 generalised minutes for adults (as we don't have a full description of their prior journey); in practical terms it means that the generalised time benefit to each new user is 3.4 generalised minutes.

Discussion – Use of Generalised Journey Time

The use of elasticities is standard across much transport demand forecasting.

Typically, the base demand is known, the impact of an intervention is also known (i.e. the reduction in generalised cost) and the elasticity is used to assess the change in demand resulting from the change in the generalised cost of travel.

For Bikeability, we know the base demand and the change in demand (a 45% increase), so the approach merely re-works the ‘standard’ elasticity equation to infer the benefit per user.

The re-working relies on two key assumptions:

- The assumed generalised cost of a typical cycle trip
- The selection of a generalised cost elasticity

Generalised Cost

Generalised cost elasticity takes account of the full range of journey elements. For public transport this would include walk, wait, in-vehicle time, fare etc.. For cycle it would include the journey time, time spend unlocking / locking a bike, and the inherent mode preferences that, in general, explain why

comparatively few people cycle when it is notionally quicker and cheaper (e.g. attitudes around exercise, safety issues, risk of getting wet etc.). The overall generalised cost of a trip will therefore be greater than the journey time alone (as is the case with public transport trips).

We have assumed a generalised cost per trip of 20 minutes. The journey time alone, based on an average 2km trip would around 8-10 minutes (assuming a speed to 12-15kmp), plus time to lock / unlock bike at either end.

Generalised Cost Elasticity

The use of the generalised cost elasticity is standard for public transport and particularly in the rail industry, where demand forecasting is undertaken based on a single-mode model using an elasticity-based approach. The standard value for rail appraisal is -0.9.

The Demand for Public Transport – A Practical Guide (TRL 2004, also known as the Black Book) summarises generalised cost elasticities based on a review of available research, for two modes (bus and rail), purpose (work and other) and three income bands. The evidence shows that generalised cost elasticities range between -0.4 and -2.0. The values vary more by income and purpose than they do by mode.

The higher the elasticity value the greater the benefit per user within the appraisal.

Cross Check Based on WebTAG Active Mode Appraisal

We have undertaken an assessment of user benefits in line with the WebTAG Active Model Appraisal Guidance. Again, this is ‘back-worked’ such that the 45% uplift is used to infer the change in utility.

This also required an assumption to be made on the ‘maximum’ percentage that could cycle, which we have tested at 20% and 40%.

These show that user benefits would represent an improvement of between 41% and 47% over the current generalised time, which when applied to a 20-minute assumed GJT is equivalent to around 8 to 10 minutes. This is higher than the benefit within this appraisal, which is 6.8 minutes.

Conclusion

While there is an element of judgment involved in developing assumption to apply, the values used for the generalised cost and GC elasticity are considered reasonable, the results benchmark closely with the ‘back-worked’ approach using WebTAG Active Mode guidance.

Benefits to Existing Users

4.7 The generalised benefit that underpinning the behavioural response in encouraging greater cycle usage also applied to existing users.

4.8 This is uncontentious for a 'conventional transport scheme' example where the 'benefit' is tangible and measurable (e.g. where there is a journey time reduction from 15 to ten minutes, the gain to all existing users is five minutes). Here the benefit persists for as long as the scheme improvement lasts.

4.9 For Bikeability, the benefit to existing users is that they become more confident in cycling. This is a benefit to the individual, as the travel experience of cycling with a lower degree of confidence can be more stressful and less enjoyable.

4.10 Confidence is gained through experience over time as well as the benefits that Bikeability would confer at a point in time. However, the evidence on Bikeability increasing the confidence and safety awareness of existing users is strong.

4.11 We have therefore assumed that existing users who attend the Bikeability course will have a perceived benefit (this is the benefit that drives behavioural change and results in an increase in

cycling). We have assumed that this benefit to existing users will only be for the first three years after the training programme is complete, because they will naturally be more confident as they become a seasoned cyclist.

4.12 This benefit is calculated as 6.8 minutes per trip, based on the elasticity-based calculation described earlier.

Time Savings to Parents (Car Trips Avoided)

4.13 New 'Bikeability' cycle trips would have previously been undertaken by another mode – the child would either have walked, taken the bus or got a lift with a parent.

4.14 For 'new' Bikeability trips it is assumed that a proportion of these (23.5%, based on average car / van mode share reported in Table 3-1) would have previously travelled by car, receiving a lift from a parent.

4.15 This response could either be based on the child's own decision to cycle, or the parents effectively allowing their child to cycle based on their greater confidence in their child's cycling ability following training.

4.16 Children cycling independently would therefore save parents making the 'school run' car trip. We have assumed 50% of former car 'school run' tips are avoided, on the basis that the remaining trips would be part of another journey (e.g. trip to work), so that only a portion of avoided school run tips would translate into an equivalent reduction in car kilometres.

4.17 The time saving is assumed to be 15 minutes per round trip.

Impact on Safety

4.18 One of the key aims of Bikeability is to make children more confident in cycling and improve safety, particularly when cycling on the road.

2.23 The Bikeability Perceptions and Experiences Report demonstrated that children felt their ability to judge risks on the roads and to signal had improved significantly.

4.19 Prior to this year there was no substantive evidence to suggest that their cycling safety perception and behaviour has changed, and therefore to help quantify the impact of change in perception on behaviour.

4.20 In February 2015 a research study was published⁴ which sought to designed to test the hypothesis that Bikeability training improves a child’s ability to perceive and appropriately respond to on-road hazards faced by people who cycle.

4.21 This question was explored by means of an on-screen quiz devised to test knowledge and skills relating to hazard perception and responding appropriately to hazards. The quiz was taken by both Bikeability-trained and untrained pupils and validated by a practical on-road assessment of Bikeability-trained children.

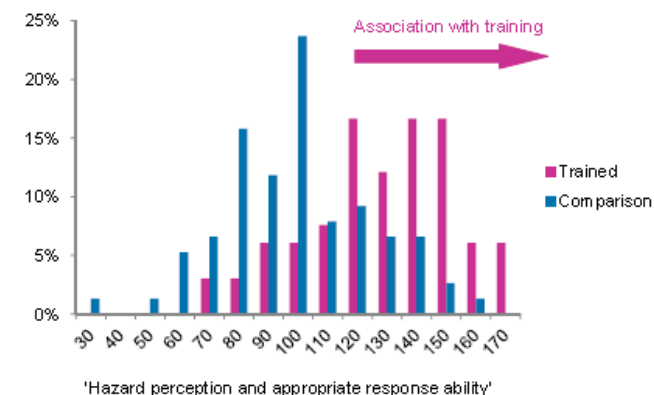
4.22 The key findings of the research were that:

- Children who participated in Bikeability Level 2 training scored significantly higher on the hazard perception and appropriate response quiz, after training, than children who had not received training.
- The effect of the Bikeability Level 2 training was undiminished when children re-took the quiz more than two months after training. This suggests that the association between training

and increased hazard perception and appropriate response strategies was sustained.

- There was a positive and statistically significant correlation between the practical assessment and the on-screen quiz, providing some evidence that the practical assessment validates the on-screen quiz as they measure the same underlying construct. However, it is not a strong enough association for performance on the on-screen quiz to be a predictor on the practical assessment.

4.23 The impact of Bikeability training on hazard perception, based on the quiz, is presented below.



4.24 The ‘size effect’ is 1.6, based on the fact that average scores among trained participants were 60% better than in the ‘before’ test.

4.25 The research does not provide a definitive evidential basis that Bikeability leads to reduced accidents among cyclists who have undergone training, but logic would suggest that cyclists that have a better perception of risks would also be more likely, on average, to change their behaviour in a manner that mitigated such risk, and therefore reduce the rate of accidents among trained cyclists.

⁴ Research into the impact of Bikeability training on children’s ability to perceive and appropriately respond to hazards when cycling on the road, National Foundation for

Educational Research, February 2015.
<http://bikeability.org.uk/wp-content/uploads/Bikeability-Hazard-Perception-Report.pdf>

4.26 Within the appraisal we have made an assumption on the impact of safety based on an assumed percentage reduction in risk.

4.27 We have also assumed that there would be safety benefits to existing users. It is assumed that children with Bikeability training have a reduced accident rate by 25%. This would appear reasonable given the 60% improvement in hazard perception based on the survey research.

4.28 The benefits applied within the analysis reflect the reduction in accident risk that apply to existing users. The accident risk to new users (based on the relative risk of cycling compared to their previous behaviour) is not included in our analysis.

Externality Benefits from Modal Shift (Non-User Benefits) – Congestion, Accidents, Emissions

2.37 Transport, and in particular car usage, imposes 'externality' costs on wider society in the form of congestion, accidents and emissions. Where Bikeability encourages modal shift from car there are benefits that accrue to 'non-users' (either those on the remaining highway network, in the case of congestion or accidents, or wider society in the case of carbon emissions). These 'externality' benefits are all valued in transport appraisal.

2.38 Estimating benefits from modal shift required an assumption to be made about the previous mode of travel. We have made the following assumptions

- Of the new cyclists, 23.5% would otherwise have been driven to school. Of these trips, half of the car trips would still occur because parents typically drop-off their children en-route to other destinations;
- The average trip distance for cyclists is 2km for children and 3km for adults per one-way trip; and
- Modal shift impacts from other trips (such as visiting family, shops, to/from leisure activities) are assumed to be the same as for school trips.
- An overall externality value of 27 pence per car km removed has been assumed, based on TAG 2018 values for Conurbations Other Roads with congestion category 3. 2010 prices.

Longer-Term Economic Benefits

4.29 Under or wholly pessimistic scenario the impact of Bikeability on behaviour would only persist over the life of the project, after which they would revert to their previous behaviour.

4.30 This is clearly unlikely as cycling will have become, to an extent, a habitual and natural travel choice to people encouraged to cycle by Bikeability

that is likely to result in increased cycle usage over a long-period. Indeed, if the barrier to cycling in the first place was one of confidence, then the fact that people cycle more as a result of Bikeability will in itself increase confidence over time as people gain experience.

4.31 We have looked at two appraisal timescales for potential longer-term benefits. These are:

- Over a ten-year period. As children are trained between the ages of nine and eleven, this broadly corresponds to their remaining period of education.
- Over a 30-year period, where benefits would accrue if people initially encourages to cycle more as children also cycled more (that those who hadn't undergone training) as adults.

4.32 The economic benefits outlined above would all, assuming the behaviour change persists, deliver on-going benefits through the remainder of education and, potentially, adulthood.

4.33 There is no firm evidence on the precise longevity of Bikeability training on either perception or behaviour, so the selection of a ten and 30-year appraisal period should be treated as being illustrative of the overall performance of the programme should the benefits persist overall

shorter or longer period. The appraisal period scenarios presented allow a clear inference to be made about the scale of benefits and overall economic performance should the benefits persist for a period of time between these points.

4.34 In the interpretation of the appraisal there is clearly more confidence in the scale of impacts over the short-term (one to three years), with a greater inherent level of uncertainty when projecting further ahead.

Health and Absenteeism

2.43 In addition the benefits outlined above, health and absenteeism benefits are potentially relevant if behaviour change persist through to adulthood (i.e. for the 30-year appraisal only). These are not considered relevant to the first ten years as health-related problems would usually not present a mortality risk during childhood, and absenteeism benefits relate specifically to reduce days of sickness from work.

4.35 There is strong evidence suggesting that physical activity can play a part in reducing premature deaths from a range of causes. The calculation is based on a 28% reduction in mortality due to improved physical fitness (TAG 3.14.1) and the cost of life at £1.65m in 2010 prices.

2.45 Improved physical fitness and general health will also lead to a reduction in absenteeism. This leads to an increase in national economic productivity and this benefit has been estimated based on the worked example in TAG 3.14.1.

4.36 It should be noted that increased cycling has also shown to improve mental health conditions. This has not been explicitly captured in the economic appraisal and is considered to be an upside to the benefits of Bikeability health benefits.

Does Behaviour Change Persist?

4.37 The key question for the appraisal of Bikeability is how long the initial behaviour change persists for.

4.38 There two extreme positions would be that:

- The increase in cycling post-Bikeability training (45% increase) only occurs over the period of training, after which all children would revert back to the average level of cycle usage. The impact of Bikeability is short-term only and has not role in encouraging cycling beyond this period.
- People who increase levels of cycling or take up cycling initially as a result of Bikeability continue to cycle at the same (higher) rate, partly due to

the confidence instilled and then because cycling becomes normal and habitual.

4.39 We consider this further in the discussion section at the end of this chapter.

Recommendations for Further Research

Safety Impacts

4.40 Research recently commissioned by DfT through the Bikeability Support Services contract will help to shed light on the safety impacts of Bikeability training. The draft research report, produced by NFER and soon to be published, is expected to find a positive association between participation in Bikeability and hazard perception ability.

4.41 However, a report by the RAC foundation suggests that generally evidence in support of road safety policies and initiatives is limited, variable and in some cases suggests impacts can be counter-intuitive (i.e. result in more accidents rather than less). The report calls for more evidence-based programmes. Further research into impact on KSI or hospital admissions would help to understand safety impact more fully.

4.42 In the absence at this stage of definitive evidence on the impact of Bikeability we have included a sensitivity test with safety benefits excluded.

Longevity of Impacts – How Long Does Behaviour Change Persist?

4.43 The draft research by NFER into the impact of Bikeability training on children's hazard perception and behaviour found evidence for some diminishing of children's hazard perception abilities over since training, particularly if they do not have opportunities to practise cycling.

4.44 Further research would be needed to understand the extent to which this deterioration over time is also a feature in cycling frequency.

5 Economic Appraisal Results

Economic Appraisal Assumptions

5.1 We have prepared the appraisal three appraisal periods - over three years, ten years and 30 years economic. These reflect uncertainty over the length of time that behaviour-change and associated benefits persist for. Key appraisal assumptions are:

- Appraisal presented on the basis benefits per trainee, with year of training assumed to be 2013.
- Price base and discount year of 2010, and discount rate 3.5% (all based on WebTAG).
- Non-work value of time of £5.71 per hour.
- Benefits decay factor of 2% per annum, to reflect potential dissipation of behaviour change impact over time.

Economic Appraisal Results

Overall Results

5.2 The overall results are presented in Table 5-1. On the basis of the appraisal inputs and assumptions, the economic performance of the Bikeability appraisal shows that:

- Taken over a period of 3 years only the programme will deliver a benefit –cost ratio of

3:1, which is classified as high value for money by the DfT.

- Over a period of 10 and 30 years the BCR would increase to 5:1 and 7:1 respectively. Essentially, there is a considerable upside should the behaviour change impacts that are observed in the short-term, translate into a change in longer-term behaviour (i.e. that Bikeability trainees retain their increased likelihood of cycling in the future, compared to those who don't).

Breakdown of Benefits

5.3 The annual benefits by category over the 30 year appraisal period are shown in Figure 5.1, and the split of benefits under the short, medium and longer-term appraisal scenarios are presented in Figure 5.2.

5.4 These show:

- In the short-term benefits to existing cyclists (user benefits) and safety benefits together comprise the majority of benefits.
- In the medium-term (years 3-10), benefits to new users and the associated benefits from modal shift (externality) and time savings to parents (fewer lifts) are the main benefits.
- If behaviour change persists to adult-hood then significant health benefits would accrue.

Table 5-1 Cost Benefit Appraisal Results (£ per trainee)

	Short Term (1-3)	Medium Term 1-10)	Longer Term (1-30)	Comment on basis for estimation
Costs	47	47	47	Input value is £40 per trainee, plus 10% DfT management costs. Within appraisal profiled over 2 years, market price adjustment applied and discounted to 2010.
Benefits				
Benefits to Existing Cyclists	69	69	69	User benefit to existing users. Elasticity approach used to estimate change in generalised cost (benefit per trip) resulting from uplift in demand. Estimated to be 6.8 minutes per trip. Benefit only applied over 3-years only.
Time Savings to Parents	21	68	68	For 'new' Bikeability trips it is assumed that a proportion of these would have previously travelled by car (lift from parents). Children cycling independently save parents making the 'school run' car trip. We have assumed 50% of former car 'school run' tips are avoided. Time saving assumed to be 15 minutes per round trip.
Benefits to New Cyclists (child)	15	49	49	People changing behaviour to cycle do so because they perceive a benefit. Scale of benefit based on elasticity-based approach. Benefit per trip is 3.4 minutes (6.8 minutes 'full benefit' with rule of a half applied).
Externality benefits (child)	6	19	19	Reduced car trips (fewer lifts from parents) result in less congestion, accidents and emissions. Based on average one-way trips distance of 2km. Decongestion rate of 27 pence per vkm (2010 prices) removed used based on TAG 2018 values for Conurbations Other Roads with congestion (category 3). No real increase in congestion value over time applied (to reflect worsening congestion in future)
Externality benefits (adult)	0	0	15	Higher level cycle usage through adulthood would result in correspondingly lower car use.
Health	0	0	70	Higher level cycle usage through adulthood results in reduced mortality risk. Valued in in with WebTAG guidance.
Absenteeism	0	0	7	Higher level cycle usage through adulthood results in fewer days off sick. Valued in in with WebTAG guidance.
Safety (child)	23	23	23	Reduced accident risk based on increased confident. Accident risk reduction of 25% assumed and applied over first 3 years only.
Total Benefits	135	228	321	
Net Present Value	87	181	274	
Benefit : Cost Ratio	2.9:1	4.8:1	6.8:1	

Figure 5.1 Profile of Economic Benefits (undiscounted)

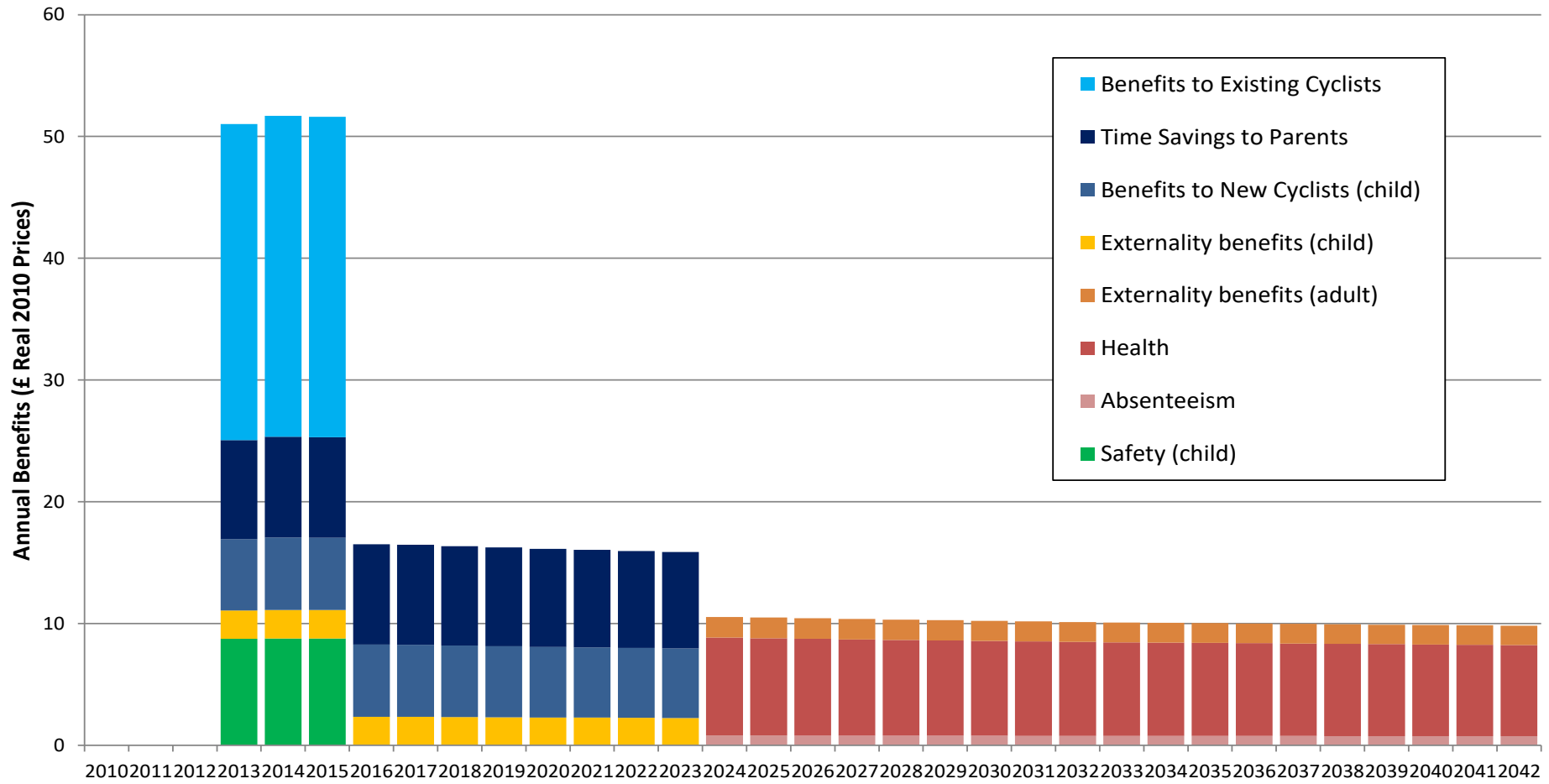
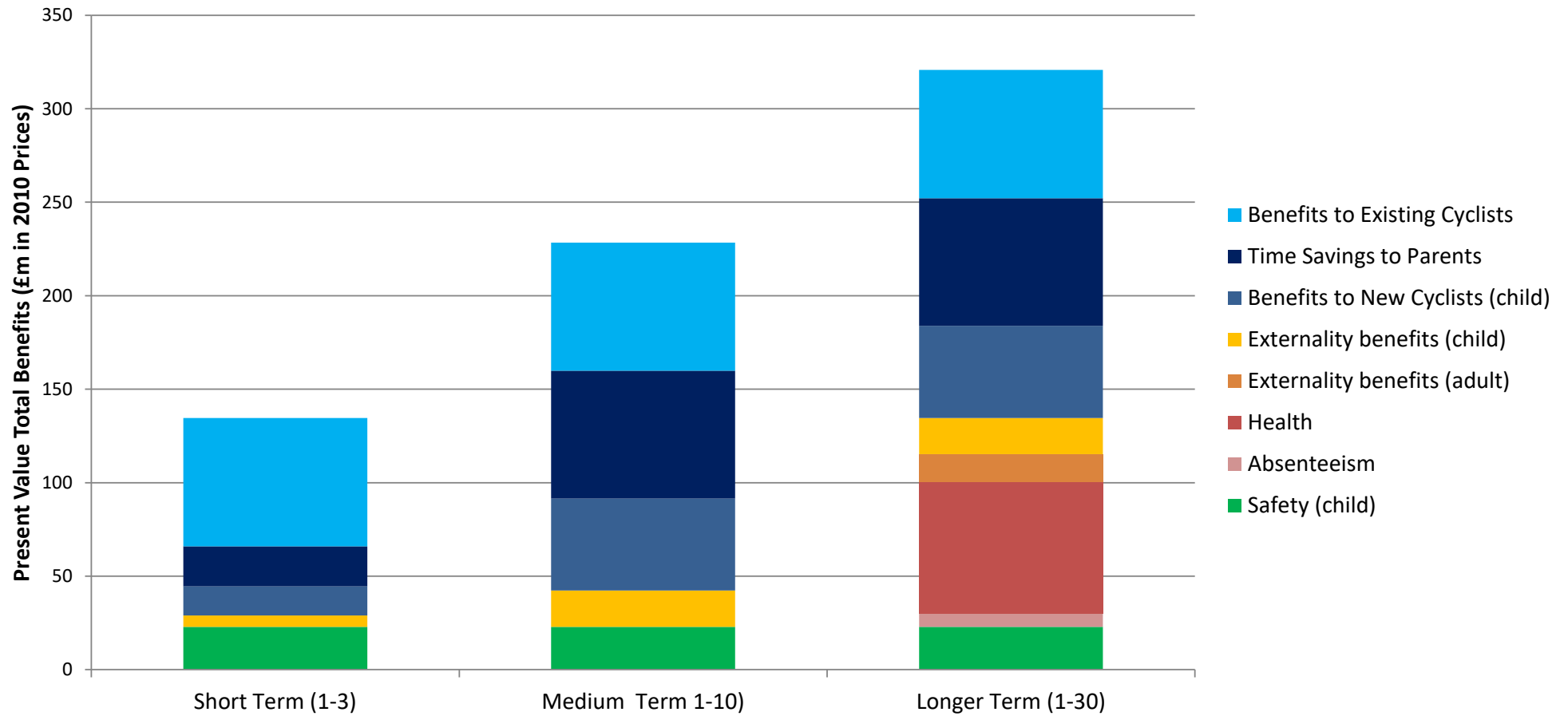


Figure 5.2 Benefits by Appraisal Period



Sensitivity Tests

3.8 Given that there are a number of uncertainties surrounding the input data and long-term cycling market and behavioural change, a number of sensitivity and scenario tests have been undertaken to demonstrate the robustness of the appraisal when other assumptions are employed.

These comprise:

- Sensitivity tests, looking in each case at the impact of the total removal of each benefit stream from the appraisal.
- Scenario tests – where we have flexed some of the key appraisal assumptions to test their materiality in terms of the overall scheme performance.

The tests are presented in Table 5-2 and Table 5-3.

The sensitivity tests show that the highest sensitivity within the appraisal is to the level of use benefits to existing cyclists. If these are removed the BCR over 3-years reduces to 1.5:1. Under all other sensitivity tests over 3 years the BCR remains around 3:1, and all tests over a ten-year period or greater are between 3.5:1 and 7:1.

The scenario tests show that the under each ‘downside’ scenario the appraisal over 3-years

remains above 2:1, and above 3.5:1 in the medium / longer term.

Table 5-2 Sensitivity Tests

Sensitivity Tests	Short Term (1-3)	Medium Term 1-10	Longer Term (1-30)
Central Case	3.2	5.3	7.3
Sensitivity Tests (removal of each benefit)			
Benefits to Existing Cyclists	1.5	3.6	5.6
Time Savings to Parents	2.7	3.9	5.8
Benefits to New Cyclists (child)	2.8	4.1	6.0
Externality benefits (child)	3.1	4.9	6.9
Externality benefits (adult)	3.2	5.3	7.0
Health	3.2	5.3	5.8
Absenteeism	3.2	5.3	7.1
Safety (child)	2.7	4.8	6.8

Table 5-3 Scenario Tests

Scenario Tests	Short Term (1-3)	Medium Term 1-10	Longer Term (1-30)
Central Case	3.2	5.3	7.3
Base demand increase +50%	5.2	8.4	10.3
Base demand reduction -50%	2.1	3.5	5.5
No Decay in benefits (central = 2%)	3.2	5.6	8.4
Decay in benefits of 5% p.a. (central = 2%)	3.2	5.0	6.2
Generalised cost elasticity of 1.5	4.6	7.3	9.3
Generalised cost elasticity of 0.5	2.3	4.0	6.0

