

HEAT is the new cool – smarter appraisal of active travel

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1 Abstract

Evaluation and appraisal are essential tools in the identification and assessment of value-for-money transport interventions, irrespective of mode or scale. However, some of the established methodologies may not always be appropriate for ‘Smarter Choices’ interventions, which can deliver high impacts, despite low costs and short lead-in times.

Scottish Transport Appraisal Guidance (STAG) represents best practice in transport appraisal, supported by a Technical Database. The Guidance supports the Scottish Government’s objectives by providing a clear framework to assess evidence based transport problems and opportunities. It does so by promoting robust, objective-led analysis that can be consistently applied in all transport appraisal contexts. Since 2009, this has included methodology to appraise walking and cycling schemes (Transport Scotland, 2009). In 2013, the Monitoring and Evaluation of the Smarter Choices, Smarter Places Programme – Going Smarter Final Report (Halden et al, 2013) recommended that STAG could offer more detail on how to appraise Smarter Choices initiatives. This was supported by feedback provided through an Appraisal and Modelling in Scotland user group workshop.

In 2014, Transport Scotland commissioned CH2M to examine available and emerging best practice to determine if opportunities exist and if there is evidence to support enhancements to the appraisal of active and sustainable travel interventions. The findings of this review will be helpful to many practitioners, with wider implications for evaluation and appraisal, not just those of active modes.

This paper will:

- Summarise the evidence from a thorough review of available and emerging methodologies for the appraisal of active travel in the UK and internationally;
- Summarise the evidence from a meta-analysis of reports and publications on the benefits of active travel;
- Report on a workshop with key stakeholders to examine current and emerging best practice;
- Discuss potential Case Studies that illustrate different approaches to the appraisal of active travel;
- Summarise early findings presented to Transport Scotland.

This paper will also highlight the active travel related methodologies included in STAG which currently appear to be underused by practitioners.

2 Background to this paper

2.1 Overview

Smarter Choices, Smarter Places was a Scottish Government project launched in 2008, in which seven communities received funding to improve their built environment and to encourage sustainable travel. In 2013, the Scottish Government published Halden et al, 2013 (see section 4.2.2 below). One of the report’s recommendations suggested that “STAG could offer more detail on how to appraise Smarter Choices initiatives”.

In October 2013, a workshop on the appraisal of active and sustainable travel was held by Transport Scotland to gather the views of stakeholders in relation to STAG, including some key stakeholders to the Smarter Choices, Smarter Places Programme. It also provided the opportunity to share best practice and experience with respect to the appraisal and evaluation of active and sustainable travel interventions. The workshop identified a number of themes for consideration by Transport Scotland, including potential enhancements to STAG.

2.2 Introduction to STAG

The Scottish Government requires all transport interventions receiving its funding, approval or support to complete an appraisal using STAG. This is an objective-led and mode-neutral appraisal technique which uses robust evidence to identify the best solutions to transport problems or opportunities. STAG is based upon best practice and uses a range of sources to ensure comprehensive and accurate information is provided to decision makers. A large technical database underpins the guidance and draws in sources of information from both Scotland, the UK and further afield.

STAG was first published in 2003, refreshed in 2008 and is suitable for appraising a range of interventions including:

- Cycling and walking improvements;
- Public transport – rail, bus, tram;
- Road schemes; and
- Development of transport and/or land use plans, policies and strategies.

The appraisal should consider a wide range of options initially, which are 'sifted' to reduce the number of potential solutions to a selection of the most feasible. Once completed, the appraisal is recorded in a STAG report and summarised in Appraisal Summary Tables (ASTs), which clearly show the outcomes of the appraisal of the selected options.

By following this procedure for appraisal, it is possible to readily identify the most effective potential solution for the transport problem/opportunity in a clear, consistent and robust manner. Appraisals should always be applied proportionately – the level of detail of the appraisal should be determined by the scale of the impacts of the transport issue being addressed.

In 2009, a 'Business as Usual' update to the database (Transport Scotland, 2009) introduced a 'Physical Fitness' section to enhance guidance on the appraisal of walking and cycling schemes. This recognises two benefits associated with walking and cycling schemes i.e. reduced mortality rates and reduced absenteeism rates, using methodology from WebTAG Unit 5.1 (see section 3.3.2). Indicators are included to measure the number of lives saved and the number of lost working days avoided; both as an annual measure and over the appraisal period, alongside their monetised present values. Wider health benefits can be assessed qualitatively at the 'Policy Integration' stage of the STAG process and specifically using the Policy Assessment Framework (PAF) tool.

2.3 Research aim and methods

The aim of this research was to examine available and emerging best practice to determine if opportunities exist, and there is evidence to support, enhancements to the appraisal of active and sustainable travel interventions within STAG.

The next section of this paper will:

- Summarise the evidence from a thorough review of available and emerging methodologies for the appraisal of active travel in the UK and elsewhere;
- Summarise the evidence from a meta-analysis of reports and publications on the economic and wider benefits of active travel;
- Report on a workshop with key stakeholders to examine current and emerging best practice.

The activity was focussed on a desktop literature review of the methodologies used for the appraisal and evaluation of active and sustainable travel interventions. The objective of this review was to gain an insight into the methodologies which are currently available and research into developing techniques. The review also considered evidence on the benefits of active travel. Both elements of the review were informed by discussions between Transport Scotland and the Department for Transport (DfT) and by a workshop which was carried out with stakeholders.

3 Findings of the Literature Review

A wide variety of data sources were included in the literature review. These included:

- Appraisal guidance such as WebTAG (DfT), WelTAG (Welsh Assembly Government, 2008) and sources from Europe and Australia;
- Appraisal tools, including the Health and Economic Assessment Tool (HEAT) and Mosaic (Oregon Department of Transportation, 2013);
- Reports for Governments, including Halden et al, 2013; Department for Transport, 2014a and 2014b; and Public Health England, 2011
- Academic reports, including as Brand et al, 2014; Careno et al, 2013; Goodman et al 2014; Martin et al, 2014 and Woodcock et al, 2014
- Reports from 'Third Sector' organisations and Non-Governmental Organisations, including Glasgow Centre for Population Health, 2013 and Mental Health Foundation, 2013.

3.1 Review of available and emerging appraisal guidance

National policy and strategy places increasing emphasis on the health benefits of regular, moderate physical activity. There is a growing body of evidence that 'active travel' also benefits the economy (Warren, 2008; Cavill Associates, 2009). Evidence also indicates that active travel can deliver cost savings for health and social care services, as well as reducing congestion and pollution (Department of Health, 2011). The 2009 STAG update (Transport Scotland, 2009) considers the benefits of reducing mortality and absenteeism. The aim of this research was to examine available and emerging best practice to determine if opportunities exist, and there is evidence to support, further enhancements to the current STAG guidance for active travel.

3.2 Review of evidence on the economic and wider benefits of active travel

The second stage of the literature review comprised a desktop review of documents, information and data on the economic and wider benefits of active travel. Several sources had been specified by Transport Scotland, which contained a number of references and suggested sources relevant to this study. These were reviewed to determine whether they contained useful evidence to support enhancements to the STAG appraisal guidance.

3.3 Review of guidance for the evaluation and appraisal of active travel

3.3.1 Overview

A review was carried out of appraisal methodology from a number of countries which revealed the following:

- Appraisal methodology in Scotland has many similarities with international appraisal guidance, however the latest version of WebTAG (for example) covers several issues which are not present in STAG;
- The health and economic assessment tool (HEAT) developed by the World Health Organisation (WHO) is frequently referenced in literature and appraisal guidance and is being adopted as best practice by a growing number of countries
- The main focus of current active travel appraisal is on measuring changes in physical activity and estimating the benefits of reductions in mortality (the annual death rate in a given population);
- The beneficial effects of active travel on morbidity (disease and disability) is widely discussed, but current evidence is more limited, leading to greater uncertainty over the inclusion of morbidity benefits in economic appraisal;
- Appraisal of the carbon benefits from increases in active travel is limited in both guidance and application; and
- Sensitivity testing on the key assumptions underlying an appraisal is important, as results can be highly sensitive to forecasts and assumptions.

3.3.2 International comparative appraisal guidance

Appraisal methodology in Scotland has many similarities with international appraisal guidance. However the latest version of WebTAG covers several issues which are not present in STAG. WebTAG units on Active Mode Appraisal (A5.1) and Modelling Smarter Choices (M5.2), give comprehensive guidance on how to estimate and report the impacts of active travel. The units on Environmental Impact (A3), Social Impact (A4.1) and Marginal External Costs (A5.4) also include guidance which is relevant to active travel.

Table 1 – Methodology from WebTAG Units A5.1 & M5.2 with potential to enhance STAG

WebTAG Unit A5.1	WebTAG Unit M5.2
<p>Active Mode Forecasting using similar methods to WebTAG:</p> <ul style="list-style-type: none"> • Comparative study • Estimation from disaggregate mode choice models • 'Sketch plan' methods 	<p>Distinctions are drawn between:</p> <ul style="list-style-type: none"> • 'hard' measures (those which have a direct impact on traveller's generalised costs) and • 'soft' measures (which change travellers' response and behaviour to cost without affecting those costs)
Monetising journey quality benefits (see Unit A4.1)	Appraisal of smarter choices using model outputs
Marginal External Cost approach to estimate change in accident rates and environmental disbenefits (see Unit A5.4)	Review of evidence on the effects of Smarter Choice initiatives and guidance on 'benchmarking' of impacts in terms of target car trip reduction
More explicit guidance for active mode related decongestion, indirect tax and time saving impacts	Guidance for modelling the most common Smarter Choice packages including workplace travel plans, school travel plans and targeted marketing initiatives
Appraisal & Option Summary Tables could explicitly demonstrate active travel benefits e.g. Physical Fitness similar to the Analysis of Monetised Costs and Benefits (AMCB) table	Guidance on use of model parameters, including values of time, mode constants, generalised cost components, commuting trips rates, and sensitivity tests
Inclusion of sensitivity testing guidance specific to the appraisal of walking and cycling schemes	
Monetisation of noise impacts (see Unit A3, section 2.2.23)	
A summary of the active mode scheme appraisal process and a case study example	

There are also elements within WebTAG which could have relevance in Scotland. Walking and cycling are included as components in the Transport Economic Efficiency (TEE) table. Also, a Health Impact Assessment is a mandatory requirement, to assess the impacts of transport interventions on the health of the population and the distribution of those effects within the population.

A summary review was carried out of appraisal practices in several European countries, including:

- Austria, where the Federal Ministry of Agriculture, Forestry, Environment, and Water Management used the HEAT tool to estimate the benefits of current cycle modal share and forecast the impacts of policies to increase this;
- The Netherlands, where 'Overzicht Effecten Infrastructuur' (overview of the effects of infrastructure or OEI) guidelines¹ have been used since 2000 for all large infrastructure projects and can be used for smaller projects. It uses social cost-benefit analysis, seeking to monetise benefits where possible and uses values of travel time which are comparable with other northern European countries;

- Sweden, where the Swedish Road Administration has adopted the HEAT tool for their official 'toolbox' for economic assessment of cycling infrastructure.

New South Wales (NSW) in Australia was highlighted in an International Comparison of Transport Appraisal Practice carried out by the University of Leeds (Mackie & Worsley, 2013). In March 2013, Transport for NSW released a new appraisal manual, which made reference to a cycling guidance document, which includes a cost-benefit analysis (CBA) model, linked to an Excel tool.

3.3.3 Health and Economic Assessment Tool

HEAT was developed by the WHO as a means of estimating the health benefits of cycling and walking. It uses CBA to estimate the benefits of reduced mortality. This comprises on average over 70% of the measurable health benefits of active travel. Using data entered by the user, HEAT estimates the number of premature deaths which would be averted as a result of walking or cycling, and applies the value of a statistical life (VSL)² to produce a monetised estimate of benefits.

HEAT calculations are intended as estimates of the order of magnitude of the expected effect of an intervention. It is designed for assessments at the population level and for regular habitual activity by adults³ only. It is not suitable for populations with high average levels of walking or cycling (such as postal delivery workers or bicycle couriers).

HEAT is referenced in much of the literature which has been reviewed, and is incorporated in STAG, WebTAG and appraisal guidance in a growing number of other countries. The WHO has considered whether it would be appropriate to include the beneficial effects of active travel on morbidity (disease and disability) within HEAT. The current evidence for this is more limited and the WHO believes that there is not yet sufficient certainty to include morbidity benefits in economic appraisal.

The WHO released a new version of HEAT in August 2014, with:

- Updated relative risk functions for walking and cycling;
- New VSL values with averages and country-specific values; and
- Updated and more detailed mortality rates for European countries.

3.3.4 MOSAIC value- and cost-informed transportation planning tool, developed by the Department of Transportation in the US State of Oregon

In the USA, appraisal tools vary from state to state. The Oregon Department of Transportation uses Mosaic [<http://www.oregonmosaic.org/>] developed by CH2M, as a "least cost planning" methodology⁴ to support decision making during the development, evaluation, and recommendation of solutions. Mosaic is a 'toolkit' that includes an Excel workbook, a user guide and other features that enable users to consider supply and demand-focused transportation actions, incorporate monetised and non-monetised indicators, and allow a range of projects and programs to be considered in decision making. It is designed to evaluate multimodal 'bundles' of investments and demand management strategies as part of complex corridor or transportation system plans, rather than individual projects.

Mosaic allows users to gather a variety of data about possible impacts of transportation investments, and to weigh and compare them on both a benefit-cost scale and a values-based scale that is weighted with stakeholder input. The latter is an integrated multi-objective decision analysis (MODA) methodology⁵ for scoring and weighting non-monetised impacts that can be measured quantitatively or described qualitatively.

The Mosaic workbook and user guide incorporate a number of simplified models (termed 'sketch models' or 'sketch planning tools') to help users in the estimation and monetisation of transportation investment benefits that are still subject to ongoing research. Examples include a model⁶ to estimate reduced incidence of six diseases⁷ resulting from increased physical activity. The data used to populate the Quality of Life indicators is largely derived from work done by the user in the 'sketch models' worksheet.

The two Mosaic categories which are of most relevance to this study are 'Quality of Life & Liveability' and Equity, which include the following indicators.

Table 2: Mosaic Specific Indicators (selected)

Category	General Indicators	Specific Indicators	BCR	MODA
Quality of Life and Liveability	Physical Activity	Health benefits of active transport: Lives saved due to active transport Reduced incidence of disease due to active transport	✓	
	Journey Ambiance	Quality of the travel environment		✓
Equity	Quality of Life	Distribution of health benefits from active transportation across population groups		✓
	Safety	Distribution of accident rates (fatalities and injuries) across population groups		✓

Mosaic is a very comprehensive guidance on how to appraise transport interventions. This review focussed on the Quality of Life and elements of the Equity criterion which correlate with the Environment and Additional Information chapters in STAG (7 and 17 respectively). Some of the sketch models described could be incorporated into STAG to enable more comprehensive estimation of demand and capture of the health benefits associated with active travel, though further research would be required to determine precisely where they would fit into the database and ensure that they are appropriate to the Scottish context. Depending on the degree of change desired, this may have implications for Appraisal Summary Tables (ASTs) and the Option Summary Table (OST).

3.3.5 How urban transport projects are appraised: current practice in the EU

This document (Hüging et al, 2014) is described as a 'Common Practice Reader'. It identifies specific appraisal practices and common international themes and issues. The report asserts that CBA is rarely undertaken to objectively test the performance of significantly alternative measures, but rather to support a policy 'path' that has already been taken implicitly or in principle. It includes a number of criticisms of the assessment of sustainable transport measures using CBA:

- The benefits of sustainable transport measures are often associated with reducing the externalities of motorised transport, but many of their effects are difficult to quantify or monetise, so are not reflected in traditional CBA;
- CBAs are rarely conducted for small scale, sustainable transport initiatives, as the data and effort required are considered excessive in comparison with the costs of the intervention;
- There is little evidence that the BCR of sustainable transport influences funding; sustainable transport projects are typically implemented to address specific problems (such as congestion or air pollution);
- Assessment of sustainable transport measures suffers from a lack of detailed data and methodological guidance. Consequently, quantifying and monetising a project's real effects is difficult and may be associated with inaccuracies.

The report identifies two key conclusions from the analysis of appraisal practices:

1. Current Impact assessment practice does not necessarily lead to the selection of measures offering the best value for money; and
2. Sustainable Transport measures may deliver significant benefits for society and high value for money, but their implementation is inhibited by difficulties in assessing their socio-economic value (see section 3.6.7 on DfT report 'Claiming the Health Dividend).

3.6 Review of evidence on the economic and wider benefits of active travel

3.6.1 Overview

A wide range of literature on the benefits of active travel was reviewed; below are brief summaries of key texts:

3.6.2 Smarter Choices, Smarter Places Programme – Going Smarter Final Report

The results of the Smarter Choices, Smarter Places (SCSP) evaluation (Halden et al, 2013) showed that public attitudes changed in the pilot areas over the course of the SCSP programme. Attitudes towards active travel were more positive; perceptions of bus travel improved (except towards fares); and perceptions of local neighbourhoods and communities improved. Travel behaviour changes were observed in most of the study areas, with more use of active travel, a smaller proportion of trips made as a car driver and an increase in the mode share of car passenger trips. These behaviour changes had positive impacts in terms of health, carbon emissions and resulted in direct financial savings on direct financial expenditure, as well as having possible impacts on community cohesion.

The experience of the SCSP programme and project delivery provided a rich source of information and learning points that should be valuable to other authorities implementing similar initiatives in the future. The report recommended that the Scottish Government and Transport Scotland should facilitate and enable wider application of the types of investment piloted through the SCSP programme. Some of the STAG guidance was used in calculating the SCSP impacts. However, this report highlights a possible need for a section in STAG which deals specifically with behavioural change.

3.6.3 Evaluation of cycling projects under the Scottish Government’s Climate Challenge Fund

This study (Cereno et al, 2013) reviewed 19 cycling-related projects funded by the Scottish Government’s Climate Challenge Fund (CCF). It also carried out a literature review of international best practice in cycling projects and an economic appraisal for carbon emission reductions.

In summary the methodology included:

- Modal shift benchmarking - typical modal shift for CCF projects are presented, with the best performing scheme representing a shift of 5% in absolute terms;
- Modal Shift Lifecycle - how long can we expect modal shift to last? Many of the CCF projects based savings on assumptions for which a sound basis in terms of longevity was hard to identify;
- Meaningful emissions reductions: the returns on investment per equivalent kg of CO₂ from the CCF projects reviewed produced a very wide range of estimated benefits, though the report does not specifically comment on the wide variation.

Best Practice: the more successful CCF projects had three elements in common:

1. A baseline assessment allowed project progress to be monitored and actions to be changed if required;
2. CCF funding providing ‘additionality’, building upon initiatives or expertise that were already in place; and
3. They had targeted actions and realistic achievable objectives, providing a clear focus for the intervention.

3.6.4 Making the Case for Investment in the Walking Environment: A review of the evidence

This comprehensive report (Sinnott et al, 2011) sets out the arguments and evidence for investing in the walking environment. It summarises cost-benefit analyses of different types of investment in the walking environment and presents several evaluated case studies of completed walking environment schemes from the UK and internationally. A WebTAG appraisal was carried out of three walking and cycling schemes and three links to schools schemes, with benefit-to-cost ratios (BCRs) estimated to vary between 14.9:1 and 37.6:1.

3.6.5 Soft measures - hard facts; The value for money of transport measures which change travel behaviour; A review of the evidence

'Soft measures – hard facts' (Public Health England, 2011) is a critical appraisal of the evaluation of 16 travel behaviour change measures of schemes ranging from those which encourage walking and cycling, to more complex programmes in workplaces and across whole towns and cities. Key messages include:

- Travel behaviour change measures can provide very high benefits compared to costs;
- Changing how we travel can reduce the need for expensive infrastructure;
- Behaviour change measures can be implemented much more quickly than infrastructure projects;
- All measures achieve genuine carbon reductions (from 5kgs to 1,500kgs per person per year); and
- Greater impact is achieved from careful targeting of people likely to change their behaviour combined with multi-measure programmes across age groups.

Scheme impacts are expressed in terms of the cost of reducing 1,000 car kms and as kg of carbon saved. In some cases a BCR has been estimated.

3.6.6 Value for Money Assessment for Cycling Grants

This report (DfT, 2014a) summarises the analysis and evidence included in the economic cases of the successful bids for two recent DfT 'challenge' funds⁸. The report briefly explains the methods used to support the analysis. This includes the final BCRs, the main types of benefits behind both schemes as well as the assumptions used within the appraisal. It also sets out the general assumptions which have formed part of the appraisal process. These relate to the useful life of infrastructure, financial cost estimates, and costs and benefits considered.

General findings for the Cycle City Ambition Grant schemes include:

- The economic value of a range of benefits were estimated for the eight schemes, including noise, local air quality, greenhouse gases, journey ambience, accidents, physical fitness, absenteeism, congestion relief and indirect taxation. On average, over 60% of estimated benefits came from increased physical fitness, with approximately 20% from decongestion;
- The balance of benefits varied considerably, depending on the particular focus of the intervention. Decongestion and road safety provided over half the total benefits in the Bristol and Norwich schemes; whereas journey ambience provided over 25% of benefits in Birmingham and Leeds;
- As a package, the Cycle City Ambition Grant is expected to deliver around £5 of benefits for each pound invested with individual schemes' BCRs ranging from just above 2:1 to in excess of 30:1.

The combined BCR for the funding stream as a whole is 5.5:1. The analysis suggests that non-monetised impacts are likely to be minor and overall positive. The grants are therefore considered to deliver very high value for money.

3.6.7 Claiming the Health Dividend: A summary and discussion of value for money estimates from studies of investment in walking and cycling'

This report (DfT, 2014b) analyses available evidence on the benefits of active travel schemes. These include improvements to the health of the population; reducing the costs of healthcare; a more prosperous economy; as well as savings in travel time, congestion and accidents.

A summary of the key points is as follows:

- Health care costs savings element is not considered by STAG;
- Current benefits associated with active travel could be underestimated with the omission of morbidity benefits;
- The methods used to measure and value health benefits and the range of benefit-cost ratios estimated are diverse;

- Case studies highlight investment in active travel is worthwhile and provide positive BCRs, however the methodology to explain how benefits are derived tend not to be included for case studies, so it is difficult to comment on how the case studies could inform STAG guidance.

3.6.8 Copenhagen Bicycle Account 2012 – Copenhagen City of Cyclists

The Bicycle Account is a biannual assessment of cycling development in the City of Copenhagen. Safety and satisfaction are a key focus of this report (City of Copenhagen, 2013), as are the planned and implemented interventions aimed towards increasing the mode share of cycling. Investment has led to satisfaction levels with cycle track condition of 61% (up from 50% in 2 years) and for integration with public transport of 60% (up from 49% in 4 years), following an initiative to allow free carriage of bicycles on the urban rail network. However satisfaction with the condition of smaller roads without cycle tracks remains low at 32%, as with cycle parking provision across the city in general, at 29%. That said, Copenhagen has an estimated 50,000 bicycle parking spaces for a population of 550,000, and satisfaction levels for parking provision at work and close to home are 71% and 79% respectively.

3.7 Case Studies

A detailed desktop review of potential case studies has shown that there are many examples of successful active travel and 'Smarter Choices' projects in Scotland. However, none of those reviewed had used STAG to appraise or to inform decision-making. A possible exception are the Sustrans Community Links schemes, which used both STAG and WebTAG, though the ways in which the methodologies were applied are not in the public domain. Also, little information was available on their economic benefits and how these were estimated. The Smarter Choices - Smarter Places pilot projects (Halden et al, 2013) may provide some Scottish case study examples. However, these include a mixture of infrastructure and behavioural change measures making it difficult to split out the impacts.

3.8 Workshop

A stakeholder workshop was held on 22 January 2015 with attendees from local government, the health sector, Transport Scotland and third sector organisations. The purpose of the workshop was to:

- Present the early finding of the study;
- Provide opportunities to inform the study in terms of current and emerging best practice in the appraisal and evaluation of sustainable travel interventions, through a series of structured 'knowledge sharing' sessions.

The main focus of the workshop was a series of 'knowledge sharing' sessions. This was followed by a brief review of the key points from the sessions and a discussion of possible sources of case studies which could be used in the study report.

The following points were included in the workshop discussion.

3.8.1 Use of appraisal for active travel

Within the context of active travel, appraisal was mainly used by the workshop participants to evaluate between scheme options and to develop a business case, typically for larger schemes. There were no reported instances of active travel solutions emerging from a full STAG mode-neutral appraisal process. Decisions on which interventions to fund were largely based on officer judgement and ability to deliver.

3.8.2 Monitoring and evaluation

It was noted that there are a number of sources of volumetric data, but qualitative data (detail on journey purpose and attitudinal data for example) is more difficult and expensive to obtain. Budgets for active travel schemes are often too small to enable collection of primary data.

Concerns were expressed that funding bodies can expect impacts to be measurable too early. It was felt that there is an absence of data on the longer term benefits of active travel interventions. Of particular note is that Cycling Scotland is considering ways to allow the use of datasets on cycling within Scotland by partner organisations.

3.8.3 Enhancements to active travel appraisal

Suggestions included:

- Further information on the application of appraisal to active travel schemes;
- Inclusion of morbidity benefits, along with and guidance on the treatment of disease costs;
- Encouraging uptake of cycling by lower socio-economic groups, women and young people is considered important for social inclusion; demographics such as gender, age and socio-economic status of users could be taken into account in the estimation of benefits.

3.8.4 Case Studies

A number of suggestions were made by participants as to appropriate sources of case studies. These included Sustrans' Technical Reports to Transport Scotland (Sustrans 2013 and 2014) on walking and cycling outcomes from the application of grant funding. These include appraisal results for a number of Community Links schemes, using both STAG and WebTAG.

4.0 Discussion

The review of adopted and emerging appraisal guidance and methodologies showed that appraisal methodology in Scotland has many similarities with other countries reviewed. However, WebTAG suggests a number of potential enhancements to STAG and there are also elements within WeITAG which could be incorporated into STAG. Sustrans' Scotland 2014 Interim Report to the Scottish Government used both STAG and WebTAG to appraise a number of active travel schemes using. The WebTAG appraisal consistently resulted in a higher valuation of benefits than STAG, with the estimated benefits of 'Journey Quality' being the most significant factor.

A wide range of literature was reviewed on the benefits of active travel. These included several reports of projects in Scotland which included appraisal in some form, but there were no published examples of a STAG appraisal of an active travel intervention. Several organisations were contacted with respect to potential case studies, but their responses confirmed that STAG appraisal has not been generally used to date for active travel interventions.

Discussion at the stakeholder workshop also showed that STAG appraisal was not generally used by participants for active travel interventions. Views were expressed that although active travel projects are considered better value for money than road or rail schemes, it is more difficult to collect and quantify the data required for a full STAG appraisal; active travel projects typically being smaller value and more concerned with softer outcomes. The EVIDENCE Common Practice Reader (Hüging et al, 2014) asserts that sustainable transport measures may deliver significant benefits for society and high value for money, but their implementation is inhibited by difficulties in assessing their socio-economic value.

HEAT is frequently referenced in literature and appraisal guidance, and is in use in a growing number of countries, which recognise that it is evidence-based, transparent and adaptable. The WHO released a new version of HEAT in August 2014 and it is recommended that updates to HEAT are taken cognisance of in STAG.

HEAT only estimates the economic benefits of reduced mortality. Literature cites many other health benefits of active travel and physical exercise. From a public health point of view, these benefits materialise more rapidly than reductions in mortality. They can also be important in motivating individuals to walk and/or cycle, as people may be more likely to increase their physical activity to improve their immediate health and well-being than to prolong their life. One possible tool for appraising morbidity benefits is the Integrated Transport and Health Impact Modelling Tool (ITHIM), developed by the Centre for Diet and Activity Research (CEDAR), at the University of Cambridge. This is referenced in the Mosaic tool and in Woodcock et al (2014).

5.0 Summary of early findings

This research has indicated some possible enhancements to STAG which have been presented to Transport Scotland for review and consideration. These early findings are summarised below, categorised by timescale for possible implementation. Some enhancements could be applicable within the next 18 months, using evidence from other appraisal methodologies (notably WebTAG) or reports which have been published. Incorporating morbidity benefits has been included within the medium term (18-36 months), along with incorporating guidance within STAG on monitoring and evaluating behavioural change initiatives, mental health and 'wellbeing' benefits. A full consideration of the evidence from the comprehensive MOSAIC tool and adaptation of WebTAG Unit 5.2 to a Scottish context is included with a timescale of over 3 years, as is consideration of the outcomes of the EVIDENCE project, which is scheduled to complete in 2016.

In several cases, it is likely that further research would be required to determine more precisely the changes that may be required to STAG, e.g. in respect of decongestion benefits, morbidity benefits, behavioural change, the MOSAIC tool, mental health benefits and work carried out at the Victoria Transport Policy Institute on evaluating active transport benefits and costs.

Short-term (up to 18 months)

- Updating the HEAT parameters to the latest version and including a worked example case study with a Scottish context;
- Publishing further guidance on data collection, monitoring and evaluation of active travel interventions;
- Incorporating further elements of WebTAG units 4.1 and 5.1;
- Monitoring how the DfT intends to take forward the findings from 'Claiming the Health Dividend'.

Medium term (18-36 months)

- Incorporating morbidity benefits;
- Monitoring and evaluating behavioural change initiatives;
- Incorporating benefits to mental health.

Longer term (over 36 months)

- Adaptation of WebTAG UNIT M5.2 Modelling Smarter Choices to a Scottish context;
- Incorporating some of the evidence from the MOSAIC tool;
- Incorporating relevant outcomes from the EVIDENCE project.

References

N.B. This is an abridged list of the references used in the study, which are relevant to this paper.

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Endnotes

¹ Only available in the Dutch language

² The value placed on changes in the likelihood of death, not the price someone would pay to avoid certain death

³ The recommended applicable age range is approximately 20–64 years (HEAT for cycling) and 20–74 years (HEAT for walking)

⁴ Least cost planning is a process of comparing direct and indirect costs of demand and supply options to meet transportation goals, policies or both, where the intent of the process is to identify the most cost-effective mix of options

⁵ Also known as multi-criteria analysis (MCA)

⁶ Integrated Transport and Health Impact Modelling Tool (ITHIM), developed by the Centre for Diet and Activity Research (CEDAR), a Centre of Excellence in Public Health Research at the University of Cambridge, funded through the UK Clinical Research Collaboration

⁷ Breast cancer, colon cancer, cardiovascular disease, dementia, depression and diabetes

⁸ The Cycle City Ambition Grant' and the 'Cycling in National Parks Grant' funds