



Research report

**EVALUATING THE ECONOMIC IMPACT
OF SOCIAL SCIENCE:
Case studies of REF impact projects**

Report to Economic and Social Research Council (ESRC)

19 November 2015

Hull University Business School (HUBS)

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**EVALUATING THE
ECONOMIC IMPACT OF
SOCIAL SCIENCE**

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Research Council**

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Evaluating the economic impact of social science: case studies of REF impact projects

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Contents

Overview	1
Aims of the study.....	1
Method.....	2
Case studies	2
1. Energy reduction and white street lighting.....	2
2. Vision science and road safety.....	5
3. CCTV and facial composites.....	8
4. Behaviour change: 'Do Something Different'	10
Commentary on case studies.....	14
Conclusions.....	14
5. Extent and nature of actual or potential economic impact	14
6. Effectiveness of economic impact evaluation methodology.....	15
7. Common themes across case studies.....	15
8. Recommendations.....	16
Annex A - List of interviewees	17

Overview

Hull University Business School (HUBS) is pleased to submit this report to the Economic and Social Research Council (ESRC). **Professor Steve Johnson** and **Ben Fletcher** undertook the research and wrote this report, which looked at four Research Excellence Framework (REF) impact case studies, supplemented by interviews with key informants, to develop a picture of impact processes and identify estimates of the economic impact of four selected projects.

Aims of the study

The main objectives of the study were:

- identify and assess the actual or potential economic impact of the research and related activities on policy, public services, business and other areas outside academia
- apply appropriate valuation techniques to calculate values for the identified economic impacts that can be attributed to the project
- present the results of the economic assessment within the context of the pathways through which impacts have been generated

- reflect on the outcomes and identify lessons for future economic impact evaluations.

Method

The research comprised:

Document review - we reviewed the reports from four selected REF case studies (identified by ESRC), together with other relevant documents. We focused on identifying the data necessary in order to arrive at defensible estimates of the economic value of the impacts described.

Stakeholder interviews - in order to gain further insight into the nature and range of impacts, we undertook nine telephone interviews with researchers and research users, utilising an agreed topic guide. Details of interviewees are presented in Annex A.

Analysis and reporting - finally, we brought together the desk-based and interview evidence, focusing on identification of the potential for calculation of monetary values of observed impacts.

Case studies

The detailed case studies are presented in template format in the following section of the report. The selected case studies were:

1. Energy reduction and white street lighting (University College London)
2. Vision science and road safety (Royal Holloway University)
3. CCTV and facial composites (University of Greenwich)
4. Behaviour change (University of Hertfordshire)

1. Energy reduction and white street lighting

Research by the Light and Lighting Research Group, Bartlett School of Graduate Studies, UCL, overseen by Professor Tadj Oreszczyn, sought to investigate the anecdotal and unsubstantiated assumption that white street lighting provided a better quality of lighting than the traditional yellow or orange lighting. The main source of funding for this research was an ESRC grant, 'Urban Lights', from December 1999 to November 2003 with a total value of £228,488.

Research summary

Drawing on the pioneering work of Caminada and van Bommel (early 1980s), who identified facial recognition as important to pedestrians on the streets at night, in 2002, the team set about to investigate the issue further. Using the same basic methodology, and using volunteers aged 16 to 70 years old, a range of light sources were tested, including high-pressure sodium bulbs and two types of compact fluorescent light sources. Very similar results were obtained to those reported previously by Caminada and van Bommel. However, the Bartlett's research discovered that, with high-pressure sodium bulbs, it was necessary to use significantly higher illuminances, with much higher energy use, to obtain the same recognition distance.

The research was first published in 2003 in The Lighting Journal and part of an invited talk by Raynham to the Society of Light and Lighting in 2003, published as a journal essay titled 'An examination of the fundamentals of road lighting for pedestrians and drivers' (Lighting Research and Technology, December 2004). An overview was presented as a conference paper ('Urban Lights: Sustainable Urban Lighting for Town Centre Regeneration') at Lux Europa 2005, Berlin.

Further details on the research project "Reduction in UK carbon emissions through use of white light for street lighting" can be viewed at <http://impact.ref.ac.uk/CaseStudies/CaseStudy.aspx?Id=36931>

Users and stakeholders

The main beneficiaries of this work are:

- Local Authority Street Lighting departments
- British Standards Committee for street lighting – 'Code of practice for the design of road lighting - Part 1: Lighting of roads and public amenity areas' (BS 5489-1: 2003)
- Industry - street lighting lantern vendors, supplying street lighting and lamps who require accurate data about light sources to determine the size of the lamp replacement market and the Institute of Lighting Professionals (ILP) as the industry body
- UK Government - commitment to reduce emissions to 20 per cent below 1990 levels by 2020
- pedestrians and other road users.

Impact summary

Raynham's research led to the adoption of white light in residential roads and urban centres throughout the UK. At the time of the REF case study it was estimated there were circa 1,200,000 conventional street lights with white light sources across the UK and a further circa 220,000 LED lanterns that emit white light.

The primary focus of the research had been on gauging the impact of white light on street lighting and seeking quality improvements, in terms of demonstrating that white lights with lower illuminance have the same lighting benefits as the brighter traditional orange sodium lanterns. The BSI Committee CPL 34/8 (Road Lighting) dictated that the impact was one of energy and cost savings (economic and monetary) and chose to maintain the quality of lighting at the same level (non-monetary).

Economic/monetary impacts

The REF case study reported what the authors described as the most conservative estimate of energy saved by the adoption of white light. This was based upon the then current population of circa 1,200,000 conventional white light lanterns that had replaced the older 70W sodium lanterns, with an average energy saving on each lamp of 30 per cent or 28MW in the energy load of these streetlights. The REF case study claimed that the changeover to white light had saved an estimated 113 GWh of electricity in 2012. This reduction was estimated to have saved UK local authorities over £10 million in electricity costs. The PI's calculations were based on conservative consumption estimates of 0.4 kg of CO₂ emissions per KWh of

electricity at night and each lantern being on for 4,000 hours per year – and had reduced the UK CO2 emissions by 45.5 megatons.

Estimating the potential size of the UK street lighting market is difficult given the commercial sensitivities and interests of industry. The PI interview confirmed that there is only very limited data available on the price that local authorities agree with electricity suppliers, making monetary estimates of impact difficult. Estimates undertaken by the research team used data from a commercial street lighting manufacturer and vending organisation, Philips, that had estimated circa 7 million lighting units in the UK in 2012.

Non-monetary impacts

Raynham's research was published in an industry journal in 2003 and according to the REF case study and (verified via PI interview) is understood to have influenced the content of the then forthcoming code of practice for street lighting. Raynham demonstrated that the same lighting benefits as traditional sodium lighting could be achieved using lower illuminance white lighting. The British Standard (BS) for street lighting, 'Code of practice for the design of road lighting - Part 1: Lighting of roads and public amenity areas' (BS 5489-1: 2003), was subsequently published. It permitted the selection of a lower lighting class, as defined in BS EN 13201-2, allowing subsidiary roads to be lit with white lights which used a lower illuminance class than those lit with the traditional orange sodium lamps. The research had set out the quality improvements that could be achieved via white light but the BS Committee decided to maintain the existing lighting quality and save energy and costs via adoption of white light to replace traditional sodium lamps.

Identified in the REF case study and verified via the research user interview, the sector industry body highlighted that Raynham's research has instigated a closer examination of the public safety and well-being of pedestrians (and other road users) on the streets at night, articulating the clear social and public safety benefits of maintaining high amounts of street lighting. Not only did Raynham's research demonstrate the above quality improvements in street lighting of white light, it was also used by local authorities, road safety organisations and residents to support the justification for maintaining street lighting in urban areas and extending its coverage to rural areas. It can be argued to have led to an indirect non-monetary impact in terms reducing the fear of crime, crime prevention and public safety.

Pathways towards impacts

Research was first published in a non-peer review industry magazine, giving wide industry coverage among public lighting engineers and to ensure that the findings would be in the public domain ahead of a review of the British Standard on road lighting.

The BS Committee (2003) decided to permit the use of a lower lighting class, allowing subsidiary roads to be lit with white lights which used a lower illuminance class than those lit with the traditional orange sodium lamps. This dictated that the impact was one of energy and cost savings (economic and monetary), opting to maintain the quality of lighting at the same level.

As identified in the REF case study and substantiated by the PI interview, the downward pressure on energy use and reducing carbon emissions had resulted in growing demand for energy saving technology. This had driven technological developments in white street lighting by industry.

There was a trade-off between the social and public safety benefits of improving the coverage and quality of street lighting and pressure for energy reduction and cost savings.

Key lessons learned

Arriving at firm estimates of economic impact is difficult when commercial interests and sensitivities exist, resulting in limited data upon which to base impact assessment. In this case, regulation via the BS Committee in 2003 had dictated that the extent of the impact of the initial research was one of maintaining lighting quality via the adoption of white lighting - using lower illuminance and requiring less energy for the same lighting output than the original sodium lamps. This was estimated to have saved UK local authorities £10 million in reduced electricity costs in 2012 and reduced payments associated with their carbon reduction commitments, with UK CO₂ emissions estimated to have been reduced by 45.5 megatons.

This case study highlights the differing priorities of the crime prevention and public safety benefits of improving street light quality (non-monetary drivers) and downward pressure on local authorities for more efficient energy use and cost savings (monetary drivers) whilst maintaining high levels of street lighting on urban and other subsidiary roads. It demonstrates that different types of impact measurement methods and metrics are required to capture both monetary and non-monetary impacts of social science projects. In this case the economic impacts of white street lighting were measured as cost savings, reduced budgets and energy use and the non-monetary impacts in terms of crime prevention and public safety benefits of local authorities maintaining the level of street lighting.

2. Vision science and road safety

Research led by Professor Wann, Department of Psychology at Royal Holloway, University of London investigated the neural processes underpinning collision detection and the limits of human visual processing in relation to critical road traffic events. Major sources of funding were as follows:

- 2007-2010, EPSRC. Neural correlates of collision detection. £260,062.
- 2008-2011, ESRC. Perceptual judgments of children in a road crossing situation. £324,000.
- 2010-2011, Royal Society for the Prevention of Accidents. Errors in perceptual judgments amongst elderly road users. £20,000.
- 2009-2012, EU FP7. Coding of Optimal Decisions for Dynamic Environments. £377,832.
- 2011-2012, ESRC (Knowledge Transfer). Enhancing driver awareness of perceptual errors in approach speed judgments for road crossing and decisions at junctions. £89,577

Research summary

The research identified thresholds for the detection of approaching vehicles and for the discrimination of speed of vehicle approach. The research focussed on three groups that figure disproportionately in road traffic accidents: primary school children, children with perceptual-motor disabilities and drivers over the age of 75.

Further details on the research project "Vision science and road safety" can be viewed at: <http://impact.ref.ac.uk/CaseStudies/CaseStudy.aspx?Id=30208>

Users and stakeholders

The main beneficiaries of this work are:

- road users including drivers and pedestrians;
- road safety professionals, organisations, and charities;
- local authorities; and
- commercial organisations seeking to reduce the involvement of their drivers in road accidents.

Impact summary

This research played a key role in informing a national campaign to lower urban speed limits, particularly where child pedestrians are present. It has also led to improved driver safety in commercial organisations, and has contributed to the commercial design of driver assistance systems.

It demonstrated the perceptual acuity for judging vehicle approach in road users is below what would be optimal given the current range of traffic speeds. This research has further demonstrated that children under the age of 11 years and drivers over the age of 75 years are likely to make errors, and that motorcyclists are particularly vulnerable as a consequence of these errors.

Economic/monetary impacts

Wann's research (and subsequent input to North East Lincolnshire Council's Regeneration and Environment Scrutiny Panel - Select Committee on Speed Limit Regulations, 2012) contributed to the Council's decision to reduce road speed limits across the urban and rural areas in the borough:

<http://tinyurl.com/NLincsAnnouncemt>. Taking one example, the reduction from national speed limit to 50mph on the A18 Barton is indicative. Between 2007-2012 and prior to the decision, there had been 70 collisions on the road, involving 137 casualties (of which, 35 were serious injuries and four fatal), with five fatalities in the early subsequent months of 2013. In comparison, since the speed reductions were applied, collision records for the last 12 months to date (2015) identify two slight injury collisions resulting in three casualties and one serious injury collision.

North East Lincolnshire Council Report on the findings of the Speed limit/Road Safety Committee, March 2013, highlighted not only the "obvious emotional and social trauma" of a collision but also the "overall estimated cost to an area" of circa £68,323, ranging from £1.8 million for a collision involving a fatality to £21,372 for a slight collision. These cost estimations were presented to the select committee as part of the expert input by local authority transport officers and were quoted as being based upon national research, although the source was not disclosed. The officers had also presented a cost analysis of a 10 per cent and 30 per cent reduction

in collisions over a 3 year period were reduced speed limits (50mph from 70mph) to be introduced. The total cost of collisions on the stretch of road over the 3 years period at that time was £5,260,871. A 10 per cent reduction in collisions would provide an approximate saving of £526,087 and a 30 per cent reduction could save circa £1,578,261.

The '20splenty' road safety campaign group comprises 275 local campaigns and has persuaded most of the 40 largest UK local authorities to establish 20mph speed limits in residential areas. The findings of vision science research were important in providing robust evidence to support the campaign's proposals, although 20splenty also recognises the contribution of other research eg by public health geography researchers at Durham University. The influence of the research occurred through a combination of informal interactions with the director of 20splenty and also through activities such as presentations at the annual conference of the campaign group (http://www.20splentyforus.org.uk/4th_conference.htm). 20splenty do not present specific estimates of the monetary value of lives saved and injuries avoided as a result of lower speed limits; however it is clear from evidence such as the North East Lincolnshire study that the impact is likely to have been significant.

Non-monetary impacts

The research had also contributed to a local review by the Police that demonstrated how the reduction in speed had only nominal impact on journey times, whilst improved stopping distances due to lower vehicle speed had been effective in reducing the number of collisions and accidents.

As described above, there is some evidence that traffic fatalities and/or injuries are likely to have been reduced in urban areas that have reduced speed limits partly due to the research findings. 20splenty also argue that the campaign has also been instrumental in changing thinking among local authorities and transport planners towards broader consideration of the needs of all road users, not only motorists.

Pathways to impacts

One research user (Humberside Police, Casualty Reduction Officer) highlighted how Wann's research and other scientific input assisted the Police and Local Authorities (for example North East Lincolnshire) in taking decisions on proposed speed restriction interventions eg speed signage and road lining.

The 20splenty road safety campaign became aware of the vision science research through a casual conversation between the lead researcher and the chair of 20splenty. This led to a process of collaboration involving, for example, researchers presenting their findings at 20splenty conferences. The 20splenty spokesperson spoke very highly of the research and regards it as a very important input to their campaign. In particular, the fact that the research is independent and has been published in peer-reviewed journals provides additional weight to their lobbying of local authorities and national policy-makers.

20splenty refers to the Wann (and related) research on its website, for example a press release on the key findings of the research and a presentation to the 20splenty annual conference by Catherine Purcell. It is clear that the research has had a considerable impact on the ability of 20splenty to press its case with government and

local authorities. Other research (eg a recent review by Durham University of the impact of lower speed limits on casualties (<http://www.roadsafetygb.org.uk/news/3940.html>) has also been helpful to the campaign.

Key lessons learned

The researchers built up a considerable portfolio of research over a number of years, funded by several grants and involving doctoral and post-doctoral researchers. The researchers have been careful to maintain their independence and academic integrity (through peer-reviewed publications etc) while at the same time engaging with user groups such as local authorities and the 20splenty campaign group. For example, researchers have presented at 20splenty conferences. This ongoing engagement has not only enabled the researchers to track impact in a way that would otherwise be difficult, it has provided them with access to data that is valuable for their research.

Other factors that have added to both the potential for impact and the ability to track that impact include the input of the lead researcher into a Select Committee in 2012. Such activities help to raise the profile of research among user groups (such as local authorities and campaign groups), policy-makers and other relevant experts.

3. CCTV and facial composites

Research conducted by Dr Josh Davis of the University of Greenwich since 2008 has examined police investigatory methods to enhance suspect identification rates by the police – namely, morphing of facial composites using EFIT images and suspect identification from CCTV. Funding sources include:

- 2007, ESRC-funded PhD: The Forensic Identification of Unfamiliar Faces in CCTV Images.
- 2009, University of Greenwich grant. Morphing of composite images produced by trained police artists. £3,540.
- 2011, Contract with Metropolitan Police Service. Facial Identification from CCTV: Investigating Predictors of Exceptional Performance amongst Police Officers. Undisclosed.
- 2011-2012, Part funded by University of Greenwich grant. Theoretical and applied markers to measure holistic face recognition ability. £5,000
- 2014, LASIE. Large Scale Information Exploitation of Forensic Data. EU 7th Framework Programme. €8,406,523.35

Research summary

The research established how morphing multiple facial composites improves image recognition of EFIT-V images, a system used by most UK police forces, and established that the EFIT-V system was also suitable for use with child witnesses. Dr Davis' 2007 ESRC-funded PhD research on CCTV identification techniques led to a subsequent investigation in 2011 testing the facial recognition abilities of a small group of Metropolitan Police Service (MPS) officers who make a disproportionately large number of all suspect identifications from CCTV. This led to the MPS establishing a register of 'super-recognisers' – officers highly skilled at identifying faces from CCTV images.

Subsequent EU funding via LASIE 2014 has been secured to develop a test for identifying super-recognisers amongst police cohorts and improving facial image identification. Findings from Dr Davis' research continue to be disseminated via a specialist training course that operators of the EFIT-V software product have to complete, to be certified to produce composites in police investigations and via his work on the facial recognition abilities of police super-recognisers

Further details on the research project "Enhancing suspect identification rates from facial composites and CCTV" can be viewed at:

<http://impact.ref.ac.uk/CaseStudies/CaseStudy.aspx?Id=64>

Users and stakeholders

The main beneficiaries of this work is the MPS, in terms of: (a) its super-recogniser personnel and (b) EFIT-V facial composites software operators; other beneficiaries are UK and worldwide police forces seeking to adopt the MPS practices.

Impact summary

The REF case study claims that Dr Davis' research on police investigatory methods using EFIT-V facial composite images and in particular, CCTV has directly increased suspect identification rates by the MPS. This is substantiated by the research user interview conducted for this evaluation (MPS Detective Chief Inspector), who cited several examples (examined below) of changes in MPS practices as a result of the academic research.

Economic/monetary impacts

The PI interviewee cited how the use of CCTV in police investigations had reduced the cost of suspect identification compared to the use of DNA profiling evidence. Although no costings were provided, the research user interviewed for this evaluation cited internal MPS calculations suggesting that it was 12 times more cost effective than the costs and time associated with DNA profiling.

Dr Davis' research has indirectly contributed to improved crime detection and sentencing rates. This is evidenced by the changed practices adopted by the MPS as a result of the research. Its super-recognisers are the first to be provided with CCTV images of all serious crimes, of offenders in their locality or previous deployment and of officers' specific crime types specialisms. This is underlined by research user evidence that over 70 per cent of suspects confess in police interview when confronted with CCTV images. Suspect identification using CCTV rose from 50 to 150 cases per week at the REF 2014 census period. The research user cited this as having improved to 170 individuals per week at present.

Non-monetary impacts

News and media reporting on the successful deployment of the police super-recogniser personnel and suspect identification via CCTV images connected with several high profile police cases (eg London riots in August 2011) is likely to act as an indirect deterrent to crime and possible fear of crime. As at October 2013, the MPS had compiled a register of circa 200 police officers with high levels of face recognition ability, known as super-recognisers. Officers are geographically distributed across all London Boroughs.

Between 2009 and June 2013, the PI (Dr Josh Davis) delivered seven specialist training courses providing certification for operators of the EFIT-V software to produce composites for use in police investigations. Ten courses have been delivered to the present day, with circa 100 officers accessing the training.

Pathways towards impacts

The MPS had become involved in the research in April 2011 and its investigatory methods and use of CCTV had been the focus of Dr Davis' research. It led to several changed practices being adopted by the MPS, described by the research user as the "systematic" and "supervised" adoption and application of these technologies. This had seen CCTV develop from an initial focus on crime prevention to one of crime detection.

The successful deployment of the police super-recogniser personnel and CCTV suspect identification connected with several high profile police cases (e.g. London riots in August 2011) underlined its crime detection credentials but had also resulted in an indirect crime prevention impact or deterrent.

Key lessons learned

MPS involvement in the research has led to several changed practices and underlines the practical, tangible benefits of social research. The relationship that has developed between the University academic research team and the MPS through this research has provided opportunities for other spin off social research projects, such as a 2011 commission by the MPS that investigated recognition abilities of police personnel using CCTV and a successful application in 2014 for LASIE EU 7th Framework Programme funding - the research user recognising the credentials that the academic input has provided and been able to translate this to the organisational challenges it faces.

4. Behaviour change: 'Do Something Different'

'Do Something Different' is a behaviour-change technique developed by Professor Fletcher and colleagues at the Psychology Department, University of Hertfordshire. Behaviour change was identified as being a causal factor in improving wellbeing and reducing associated stress or health problems. Major sources of finance are as follows:

- ESRC funded Knowledge Transfer Programme (KTP), £114,000 (with Dr Nick Troop), 2009–11, Heales Medical Ltd
- ESRC funded Knowledge Transfer Programme (KTP), £99,000 (with Professor Karen Pine), 2008–10, Heales Medical Ltd
- EEDA/ERDF Competitive Operational Programme, £311,000 (with Dr Mike Page), 2007–13, for behaviour change using FIT.

Research summary

Professor Fletcher's research in the 1980s found that an individual's behaviour, rather than their environment, causes them to feel stressed. He argued for interventions that address the way that people interact with their world. Further research in the 1990s continued to question traditional ways of tackling stress, which led to an alternative approach, involving altering the person rather than the environment. Fletcher set this out in his Framework for Internal Transformation (FIT) Science, published in 2003. A spin-out company took FIT Science into

organisations, where it helped tackle employee issues such as stress, leadership, coping with organisational change, and the threat of redundancy. In 2008 the University of Hertfordshire adopted FIT as the basis of a personal development programme for its own students, called FIT Student, embedding it into many of its degree courses.

Fletcher's research evolved from FIT Science towards a simple behaviour-change tool useable by all – individuals as well as organisations. This was called Do Something Different (DSD).

Further details on the research project "Transforming behaviour change: do something different" can be viewed at

<http://impact.ref.ac.uk/CaseStudies/CaseStudy.aspx?Id=44472>

Users and stakeholders

The DSD behaviour tool was established as a private limited company, incorporated in 2010. Led by Professor Fletcher, it secured contracts with major private corporations and public health organisations together with bite-sized personal development modules via the web. The model has also been franchised in the Dutch language for the Netherlands.

A number of local authorities and health organisations have utilised the DSD methodology, the most comprehensive approach being adopted by the West Norfolk Partnership in its efforts to address a series of health, social and related issues in their area. Most notably, the partnership – led by the local authority but incorporating other partners – implemented a programme to help local people to improve their diets and/or to stop smoking. Projects also targeted anti-social behaviour and related social problems.

Impact summary

The researchers claim that their approach has led to significant improvements in performance among the business and public sector organisations with which their commercial spin-off company works. Unfortunately, confidentiality considerations mean that it is not possible to verify these claims, although evidence from the website of the DSD organisation (<http://dsd.me/business/>) suggests that their clients have been able to identify impacts, for example:

- Mondelèz International: 28 per cent of participants said that they were more likely to look for new ways of doing things
- PWC: participants in the Open Minds programme were more likely than non-participants to appreciate different approaches at work, seek out different opinions and try to be more open minded in relationships
- Tui: 78 per cent of participants in a digital leadership programme were more likely to turn to an online network for thoughts and ideas and 46 per cent more likely to share thoughts, ideas and successes online.

The West Norfolk Partnership (WNP) suggests that there have been considerable benefits from the DSD approach, over and above conventional public health interventions, in terms of improved diets, reduced smoking and related lifestyle

improvements. A number of internal and external studies provide some support for these claims, for example:

- a report by the National Foundation for Education Research¹ found that the application of DSD approaches in Kings Lynn Academy helped around 120 students to engage more fully with their studies, although no specific measures of 'engagement' are provided in the report
- A DSD study² of 77 older adults participating in a programme to improve physical activity yielded positive results in terms of memory test measures ('Digit Span Backwards' from 5.1 to 6.1 following participation), verbal fluency (13.7 to 16) and cardiovascular functioning (for example resting heart rate down from 68.4 to 63.6)
- an overview of several West Norfolk DSD projects³ presents data indicating uplifts in a range of measures of psychological wellbeing (eg 50 per cent uplift in frequency of looking for new ways of doing things) and behaviour (eg 46 per cent increase in taking time to notice the good things in life) in relation to participants in three DSD programmes.

In the cases of both commercial clients and public sector bodies such as the West Norfolk Partnership, it is clear that positive changes can be attributed wholly or largely to the behaviour change research. However, no economic values have been attributed to these changes.

Economic/monetary impacts

Corporate clients of DSD have their own methods of determining the financial contribution of company training and such information is not available in the public domain. While there is little evidence of direct monetary impact, it is likely that lifestyle improvements, due to interventions such as the West Norfolk programme, have led to reduced pressures on local or national health or social services budgets. It is not, however, feasible within the scope of this study to translate these improvements into monetary values.

WNP are mindful of the need to measure the impact of their work. However, it is recognised that this is difficult. The WNP informant stated that they look for research studies that try to quantify impacts eg of reduced obesity, fewer GP visits, improved educational attainment etc, but not in any robust, scientific fashion. Local authorities have continued to invest resources in the project on the basis that it has achieved results, and this can be taken as an indication of impact.

Non-monetary impacts

The PI argued there were "significant benefits that have economic implications" in terms of improved relationships, reduced stress, improved productivity, better health, greater utilisation of talents, reduced use of NHS, fewer social problems.

¹ Stevens, E., Kettlewell, K., Martin, K. and Featherstone, G. (2014). *NEET Prevention: Keeping students engaged at Key Stage 4: Second case study report*. Slough: NFER.

² DSD (2012) Research report: dementia (MCI) intervention, mimeo (supplied by West Norfolk Council)

³ DSD (2013) Recent results from a selection of Do Something Different programmes, mimeo (supplied by West Norfolk Council)

WNP and DSD researchers have identified a number of positive, quantifiable but non-monetary benefits arising from the application of DSD in different programmes. These have been measured typically through before/after questionnaires and include, for example:

- weight loss;
- increased fruit and vegetable consumption (from 3.2 to 3.8 portions per day) and increased 'life satisfaction' by teenage participants;
- improved cardiovascular functioning among dementia patients (eg systolic blood pressure reduced from 144 to 136 on average);
- improvements in a variety of wellbeing measures among university students;
- lower incidence of smoking (88 per cent quit rate after 6 weeks);
- reduced indicators of anxiety and depression (59 per cent of participants were less depressed, using a clinical scale) and better personal relationships⁴.

Pathways towards impacts

The association between WNP and DSD started in 2009 when WNP and University of Hertfordshire tried to establish a KTP. However they struggled to convince BIS of the economic benefits in terms of social return on investment. The focus of the proposed KTP project was on reducing obesity, which in turn should have positive benefits in terms of reduced demand on NHS budgets.

Having failed to get a KTP off the ground, WNP decided to invest in the project anyway. The project manager at the time liked the DSD approach because it did not try to focus just on one issue (stop smoking, eat better, do more exercise etc) but tried to look at behaviours underlying these issues and how to change them. DSD was seen a 'non-traditional slightly quirky approach'.

In addition to the association with WNP, the two KTPs associated with the research and subsequently the establishment of a commercial spin-out company all provide evidence that the research has been instrumental to some extent in achieving impact through improved performance of organisations utilising DSD behaviour change programmes (<http://dsd.me/business/>).

Key lessons learned

A number of factors can be identified that have contributed to the impact of this research:

- high quality, independent, peer-reviewed research;
- research undertaken through KTPs, with the associated benefits of commercial links and contact with potential users;
- testing of research impact on own university students and staff;
- subsequent commercial spin-out; and
- ongoing engagement with potential user groups, with commitment and investment on the part of user organisations

⁴ Figures derived from *DSD West Norfolk: Results so Far*. Mimeo, Do Something Different, no date

Commentary on case studies

The four examples were drawn from impact case studies submitted to the REF, therefore it is not surprising to find that some form of impact was identified in all cases. Our assessment concentrated on the extent to which and ways in which the monetary values of such impacts were calculated in the REF case studies themselves or by researchers and/or research users. In summary:

- In two cases (Street Lighting and Behaviour Change), it was possible to identify economic impacts realised by commercial organisations; however confidentiality constraints limit the extent to which these can be shared in the public domain.
- In all cases, researchers and users identified social benefits that – in principle – might be monetised. These include improved public health outcomes, reduced fatalities and/or injuries from traffic accidents and greater feelings of wellbeing among disadvantaged groups.
- Impacts also include potentially reduced costs to the public sector of providing services, for example detection of crime, street lighting costs or provision of health and social services.
- The geographical, spatial, temporal and social spread of the identified impacts varies considerably, making it difficult to draw meaningful comparisons. In some cases (eg Behaviour Change and Vision Science) the overall impact depends largely on the extent to which adoption spreads across different areas. However, the impact evidence tends to focus on relatively small areas.
- The extent to which impacts are converted into monetary values varies across the case studies, with relatively well-established methodologies being used in relation to measuring the value of fewer road accidents in the vision science case study and electricity cost savings and reduced CO₂ emissions in the street lighting case. More typically, impacts are presented in the form of indicators such as ‘increased wellbeing’, with no monetary values attached. It has not been feasible within the resources available for this study to undertake further valuation calculations, given the information available from the REF case studies, interviews and other related sources. In our judgement, the valuations presented in the source documents are based on sound cost-benefit approaches; where qualitative indicators of impact have been provided, insufficient data are available to enable additional calculations.

Conclusions

Extent and nature of actual or potential economic impact

It is clear from the case studies that all four of the research projects or programmes reviewed resulted in some demonstrable private or public benefit and in all cases the extent to which observed impacts could be attributed to the research itself appears to be large, although more extensive research would be required to verify this. In two cases however (Vision Science and Street Lighting) researchers and/or users were able to estimate monetary values of that impact. In the Vision Science example this can be seen in terms of reduced traffic speeds leading to a reduction in the number of traffic accidents and the costs associated with a collision or fatality. The Street Lighting case identified electricity cost savings in overall GWh, based on the KWh cost of electricity and average operation time in number of hours per year. It

also estimated the cost saving in terms of reduced CO₂ emissions. Given this variation in approach and method, it is not possible to assess the overall extent of impact arising from the four case studies.

The nature of the impact can be conceptualised in terms of a spectrum from:

- pure private benefit (Street Lighting, Behaviour Change) eg the estimated size of UK street lighting market as determined by Philips, commercial street lantern vendor
- efficiency gains in public service provision (Street Lighting, Facial Composites) eg reduced electricity costs for local authorities and CO₂ emission payments and improved suspect identification rates from using CCTV from 50 to 150 cases per week and verified by research user as being 170 individuals per week at present;
- improved individual wellbeing or behaviour, and associated reductions in demands on public services, resulting in reduced pressure on public services (Behaviour Change)
- saving of lives and/or reduced injury resulting in reduced pressure on emergency and health services and improved quality of life (Vision Science);
- wider environmental impacts through energy saving (Street Lighting)
- acknowledged but largely unquantifiable improvements in societal wellbeing eg through improved public spaces or reduced fear of crime.

Effectiveness of economic impact evaluation methodology

In the two cases where researchers or users present estimates of economic impact (Vision Science, Street Lighting) the approach appears to be sound and based on established cost-benefit methodologies for valuing saving of life or reductions in injuries. However limited attempts appear to have been made to account for the attribution problem, given that factors in addition to the research are likely to have contributed to decisions to reduce urban speed limits. The Street Lighting case does measure the extent of attribution through the adoption of white light versus older sodium lanterns as measured in KWh cost of electricity and of CO₂ emissions. For the other two cases, no economic estimates were presented. The numeric estimates of impact appear to be soundly-based, although again they appear to assume that impacts can be wholly attributable to the research. The Facial Composites case identifies improved suspect identification rates from using CCTV from 50 to 170 cases per week, verified by the research user, who also commented that the use of EFIT and CCTV technology was more time and cost effective than DNA profiling (based on internal MPS calculations - not supplied). Although we were unable to verify the latter associated costs, it is reasonable to assume a high degree of attribution from the social science input as evidenced by increased rates and speed of suspect identification. Furthermore, it is not feasible to use established valuation methods to provide a realistic estimate of the financial value of increased suspect identification rates.

Common themes across case studies

It is possible to identify a number of common themes from the cases, in terms of factors that support economic valuation and the quantification of other non-monetary impacts:

- high quality research underpinned by sound theory and methodology;
- quality and independence of research recognised and respected by external users
- applied focus of research, including one project linked to a KTP
- research focus on issues of strong public interest eg traffic accidents, crime, public health
- ability and willingness of researchers to engage with users in a variety of ways
- tracking and monitoring of impacts by researchers and/or users, often in collaboration, and typically presenting quantitative estimates
- limited use of economic techniques to measure the monetary value of research impacts
- limited consideration of attribution in relation to impact estimates.

Recommendations

This study, albeit brief and limited in scope, has demonstrated that there is potential to apply economic valuation techniques (primarily involving established cost-benefit methods) to measuring the impact associated with social science research projects.

While this has been applied successfully (and only partially) in relation to two projects, all four case studies contain elements that – in principle – might enable more robust measurement of economic impacts. Good practice that has been identified through this study includes:

- testing of potential research impact on students at the researchers' own HE institution (Behaviour Change)
- close and quantitative monitoring of changes resulting from application of techniques developed through research (Behaviour Change, Vision Science, Facial Composites)
- application of established techniques to estimate economic value of impacts (Vision Science, Street Lighting) eg cost associated with a road traffic accident, cost savings achieved by imposing speed restrictions, electricity consumption and cost savings
- dissemination of research through practitioner as well as academic networks (Behaviour Change, Vision Science, Street Lighting) eg results of the Street Lighting project were first published in lighting engineers trade journal to ensure targeted dissemination
- maintenance of links developed through KTP or other collaborative projects (Behaviour Change; Facial Composites) eg the Facial Composites project resulted in several spin off projects between the PI and Metropolitan Police Service as research user
- consideration and monitoring of wider impacts beyond immediate impact of research (Street Lighting) eg reduction in CO2 emissions and energy saving impact in addition to enhanced quality of lighting.

Annex A - List of interviewees

Peter Raynham, University College London (PI)

Stuart Bulmer, Institute for Lighting Professionals (User)

Dr Josh Davis, University of Greenwich (PI)

Detective Chief Inspector, Mick Neville, Metropolitan Police Service (User)

Professor Ben Fletcher, University of Hertfordshire (PI)

Ian Burbidge, West Norfolk Partnership (User)

Professor John Wann, Royal Holloway, University College London (PI)

Rod King MBE, Founder, 20's Plenty for Us (User)

PC Barry Gardner, South Bank Casualty Reduction Officer, Humberside Police (User)