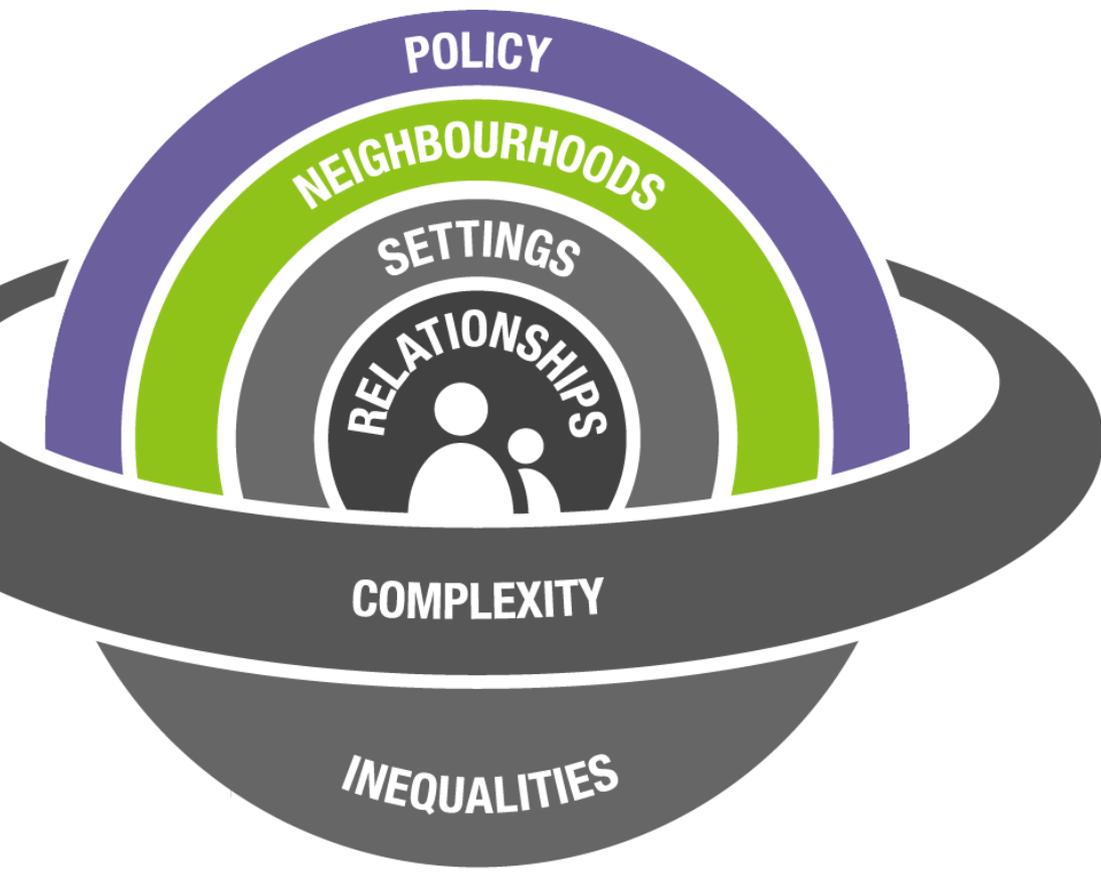


**MRC/CSO  
Social and Public Health  
Sciences Unit  
University of Glasgow**

## **Evaluability Assessment - Sustrans I Bike Communities Programme**

Paul McCrorie, Nai Rui Chng, Peter Craig



# Table of contents

|  |           |
|--|-----------|
| <b>Chapter 1: Background and programme context</b>                       | <b>4</b>  |
| Introduction   | 4         |
| Evaluability Assessment  | 4         |
| Programme context – I Bike Communities                                   | 5         |
| Background   | 5         |
| The changing programme and funding landscape                             | 6         |
| Physical activity and behaviour change                                   | 6         |
| <b>Chapter 2: The Evaluability Assessment process</b>                    | <b>9</b>  |
| Workshop 1   | 9         |
| Workshop 2   | 9         |
| Workshop 3   | 10        |
| <b>Chapter 3: Evaluation options</b>                                     | <b>12</b> |
| Key elements of the development and evaluation process                   | 12        |
| The need for a feasibility study and justification                       | 12        |
| Relevance for programme funding bodies/commissioners                     | 14        |
| Data sources   | 15        |
| Overview of options  | 17        |
| Options in detail  | 19        |
| Option 0: Existing monitoring & evaluation system                        | 19        |
| Option 1: Option 0 + modifying existing monitoring and evaluation system | 19        |
| Option 2: Option 1 + commissioning additional data gathering             | 21        |
| Outcome Measure Development and Selection                                | 21        |
| Process Evaluation   | 24        |
| Option 3: Option 2 + Testing novel methods of data gathering             | 25        |
| <b>Chapter 4: Recommendations</b>  | <b>28</b> |
| Suggested feasibility study design outline                               | 28        |
| IBC inclusion criteria:  | 28        |
| Data collection tools and outcome measurement                            | 28        |
| Indicative Costs   | 28        |
| <b>References</b>  | <b>32</b> |
| <b>Annex</b>   | <b>34</b> |
| INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE – SHORT (August 2002)      | 35        |
| INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE – LONG (October 2002)      | 38        |
| Self-Efficacy for Physical Activity Scale                                | 43        |

## List of Figures and Tables

|  |    |
|--|----|
| <b>Figure 1.</b> Revised I Bike Communities logic model  | 11 |
| <b>Figure 2.</b> Key elements of the development and evaluation process (12, p8)   | 12 |
| <b>Figure 3.</b> Five Living Domains of physical activity behaviour  | 21 |
| <b>Figure 4.</b> Example outcome variables from IPAQ to be considered for measuring programme specific PA  | 22 |
| <b>Figure 5.</b> Example presentation of Profile Mood States items   | 24 |
| <b>Figure 6.</b> Visual representation of the output that can be extracted from the activPAL activity monitor.   | 27 |
| <b>Figure 7.</b> Example timeline of IBC feasibility monitoring and evaluation   | 31 |
|  |    |
| <b>Table 1.</b> Key concepts in feasibility studies applied to IBC   | 13 |
| <b>Table 2.</b> Existing Sustrans monitoring tools and relevance to evaluation of IBC in Dumfries and Galloway   | 15 |
| <b>Table 3.</b> Overview of options  | 18 |
| <b>Table 4.</b> Relevant Sustrans monitoring tools and suggested modifications   | 19 |
| <b>Table 5.</b> Indicative major costs associated with Option 3  | 29 |
| <b>Table 6.</b> Example structure of data collection tools, procedures, and population target to answer feasibility questions for IBC (Option 2 and 3) | 30 |



# Chapter 1: Background and programme context

## INTRODUCTION

In early 2019, Sustrans asked the MRC/CSO Social and Public Health Sciences Unit, University of Glasgow to support them in the development of a monitoring and evaluation plan for their I Bike Communities project (IBC). IBC is an early-stage behaviour change programme envisaged to engage and motivate adults living in areas of high deprivation - as operationalised by the Scottish Index of Multiple Deprivation (SIMD) - to increase their physical activity (PA) levels. Sustrans were awarded grant funding for 1-year (commencing Spring 2019 – Spring 2020) to develop, deliver, and evaluate IBC in Dumfries and Galloway, Scotland. With a modest evaluation budget, it was agreed that the greatest value would be gained from conducting an Evaluability Assessment, allowing internal and external stakeholders to work towards a combined understanding of the programme's 'active ingredients' and mechanisms through which change is expected. For many, this provided the first real opportunity to explore the programme in depth and detail and offered a fresh approach to the evaluation process.

In this report we describe the IBC programme, its context, and place within the wider field of development and evaluation of health behaviour (e.g. PA) change programmes. We explain how the Evaluability Assessment process was conducted, how it was contextualised to meet the requirements of Sustrans and the maturity of the IBC programme. Finally, this report presents a number of evaluation options and recommendations that can be considered and developed as part of Sustrans' overall monitoring and evaluation plan.

## EVALUABILITY ASSESSMENT

Evaluability Assessment (EA) is a systematic and collaborative approach to prioritising and planning evaluation projects. It involves structured engagement with stakeholders to clarify intervention goals and how they are expected to be achieved, development and evaluation of a logic model or theory of change, and provision of advice on whether an evaluation can be carried out at reasonable cost or further development work on the intervention should be completed first. EA offers value by sharpening the focus of interventions that are put forward as candidates for evaluation, and establishing the likelihood of measurable impact, before resources are committed to a full-scale evaluation. It can forestall commitments to evaluate programmes where further development is required, or where there is little realistic expectation of benefit, and make the evaluations that are undertaken more useful. It also provides a basis for constructive engagement with stakeholders, whether or not a full-scale evaluation is undertaken. This should encourage the translation of research findings by ensuring that policy-makers and practitioners are involved from the beginning in developing and appraising evaluation options.

EA involves a series of workshops aimed at achieving:

- Structured engagement with stakeholders to clarify the intervention or policy goals and how they are expected to be achieved
- Development and appraisal of a theory of change, which describes how implementation of a policy contributes to change in longer-term outcomes, via

- change in a series of linked short- and medium-term outcomes.
- Development of evaluation priorities and questions.
- Assessment of existing data sources and data gaps, and consideration of evaluation options.
- Provision of advice on whether an evaluation can be carried out at reasonable cost, or whether further development work on the intervention should be completed first.

## PROGRAMME CONTEXT – I BIKE COMMUNITIES

### Background

Developed to complement Sustrans' existing I Bike schools service with children and young people, IBC has been conceived as a pilot project that will target low-active parents, carers, and guardians of the children involved in I Bike Schools. The original main aims of the programme were to:

- i. Increase levels of all-domain PA – specifically leisure time PA.
- ii. Normalise cycling and walking for short journeys
- iii. Indirectly increase the active travel and PA opportunities for pupils by enabling adults to complete the school run actively and through creating active family groups
- iv. Provide knowledge and awareness of ways to increase PA levels

Drawing upon the well-established relationships within the I Bike Schools cluster network, an IBC Communities Officer will identify and recruit adults through awareness raising at the beginning of the school term, specifically those who are either: contemplating change to their behaviour (i.e. recognise the importance of change and show some willingness to do so) but may still be reluctant or ambivalent due to limited knowledge, or perceived (or actual) lack of competency and self-confidence; and/or those who may have a stronger level of determination and are preparing for changes to their behaviour in the near future but may require some additional resources or tools to realise and facilitate their change and overcome (un)known barriers.

The programme is envisioned to last approximately 8 weeks and depending on the adults represented, will offer a combination of cycling proficiency 1-2-1 and group-based sessions, equipment provision/loaning (i.e. bikes, helmets, storage), information about local groups and activities, pedometers, maps and a route planning advice. The programme is being developed to create a motivational climate defined by collegiality and social relatedness; one which will foster individual and group levels of self-efficacy.

The IBC programme has evolved from a similarly designed service (with comparable aims) developed by Sustrans in 2009 – Bike it You Can too (BIUC2); a cycling proficiency programme targeting adult's levels and expressions of competency and confidence in the London Borough of Redbridge. The course was designed around 2-hour weekly sessions across 10-12 weeks and followed the National Standard for cycle training (Bikeability), teaching participants to ride and feel safe with traffic on short journeys such as the school commute, or to local shops. Participants were provided bikes for the duration and were offered the opportunity to purchase these at a heavily reduced cost, contingent upon high levels of course compliance.

From the 2015/16 academic year, 21 participants (all female) started the 10-week course

across two sites. Of those who started, 19 finished the course with all completing Level 1 of the Bikeability cycling training, and 9 completing Level 2. All but one did not own a bike at the beginning, and 17 decided to purchase their bikes (£90) following programme completion. Although the evaluation did not employ a 'control' site/group, or any form of randomisation to the intervention itself, the project outcomes, according to a survey of participants conducted at the end of the course, were positive (1):

- Prior to BIUC2 0% of the participants made any local journeys by bike, following the course **39%** of participants made local journeys by bike once or twice a week or more.
- Prior to project 90% of participants did not feel confident cycling by themselves, as a result of BIUC2 **72%** of participants felt more confident.
- 86% of participants did not feel confident cycling as part of a group but as a result of BIUC2 **82%** now feel more confident.
- Participants completing more than 61 minutes of PA every week rose from **67% to 84%**.
- The main barrier to participants cycling more often prior to the course was 'Not knowing how to ride a bike' with a **76%** response rate, after the course this shifted to not feeling confident on the road and not enough cycle lanes both sharing a **32%** response rate.
- The amount of PA spent cycling rose from **0% to 95%**.

### The changing programme and funding landscape

This EA was proposed in response to the challenge of making a stronger evaluation of the IBC project. IBC was a project that came out of an exercise conducted on behalf of Sustrans to identify opportunities to diversify its income and increase its impact by using social investment. The social investment project looked at possible revenue models that could generate this income and impact and it looked at potential social investment funding arrangements. This process identified revenue models that were considered likely to appeal to potential commissioners and potential social investors. First among these identified models was IBC. The funding for the pilot IBC project is from grants, rather than any alternative investment sources.

Sustrans is embarking on a monitoring and evaluation project for IBC which aligns with the reporting requirements of Transport Scotland, and which aligns with other monitoring and evaluation approaches elsewhere within the portfolio of Sustrans delivery activity in Scotland. However, Sustrans was of the opinion that this will not go far enough towards an evaluation that will satisfy the needs of either potential social investors or of potential commissioning bodies (the current proposed monitoring approach is relatively limited in scope and has a very modest budget). So, the aim of this EA was to identify the evaluation needs required by potential funders and commissioners, and to devise an evaluation approach that enables Sustrans to adequately respond to these needs.

### Physical activity and behaviour change

Behaviour change interventions can be defined as coordinated sets of activities designed to change specified behaviour patterns, such as PA behaviours (2). The literature is not devoid of these types of studies in adults, with an increasing number of different approaches having been employed over the last 50 years (3). The determinants of PA are complex and can be best understood through the lens of social ecology: the socio-

ecological model (SEM) provides a framework for understanding the determinants of health behaviours such as PA (4). Where some, particularly earlier, theories (e.g. 5, 6) place emphasis on intrapersonal factors (e.g. individual biology, demographics, and psychological factors such as motivation), ecological models include a population focus, and make explicit reference to interdependencies between multiple spheres of influence, including intra and interpersonal factors (e.g. relationships), behavioural settings (e.g. workplace), the built, natural and socio-cultural environment (access to amenities and facilities to be physically active such as an active travel infrastructure), and policy factors (7). It is widely accepted that the most successful intervention programmes are those that acknowledge this complex interdependency across the levels of influence by designing and incorporating activities that target at more than one level.

“Problems often arise in the evaluation of complex interventions because researchers have not fully defined and developed the intervention”(8, p.694). Poor intervention design can waste both public resources through expensive evaluation, or worse, when ineffective interventions are implemented when unevaluated (9). As such, there is a strong consensus in the evaluation field that interventions should be designed using strong programme theory. Three main reasons exist as to why we should employ theory when designing interventions: i) interventions are likely to be more effective if they target causal determinants of behaviour and behaviour change; ii) theory can be tested and developed by evaluations of interventions only if those evaluations are theoretically informed; iii) theory-based interventions allows us to better understand what works and thus provides a basis for developing theory across differing contexts, populations and behaviours.

There are number of existing frameworks and guidance for those wishing to develop public health interventions, many of these are briefly described in a paper by Daniel Wight and colleagues in 2016 (9). Some of these require great technical skill and resources, where others provide little detail on intervention development. In response, Wight and colleagues developed a pragmatic six-stage guide (termed 6SQUID) to the essential stages of intervention development, designed to assist those working in public health fields. These are:

1. Define and understand the problem (e.g. insufficient levels of PA and increased sedentary lifestyles and their impact on physical and mental health) and its causes (a number of proximal and distal determinants have been cited that incorporate everything from genetics (10) to national policy).
2. Clarify which causal or contextual factors are malleable and have greatest scope for change (these can be at any point along the causal chain).
3. Identify how to bring about change: the change mechanism (or ‘active ingredient’) – the critical process that triggers change for individuals, groups, or communities.
4. Identify how to deliver the change mechanism. Work with stakeholders to develop an implementation plan.
5. Test and refine on small scale. Conduct feasibility testing and adapt/edit as required.
6. Collect sufficient evidence of effectiveness to justify rigorous evaluation/ implementation. Establish some evidence that the intervention is working as intended.

Within this six-stage approach, there are a number of other helpful tools that can be

employed to assist the process. For instance, to further guide steps 2, 3, and 4, one could employ Susan Michie and colleague's Behaviour Change Wheel (BCW) (2); a comprehensive and coherent framework that identifies nine intervention functions (Education, Persuasion, Incentivisation, Coercion, Training, Restriction, Environmental Restructuring, Modelling, and Enablement) that can be linked to an underlying behavioural system - the COM-B model. In this model, three main factors can be identified as prerequisites for engaging in a behaviour: Capability (C; an individual's psychological and physical capacity to engage in the activity, including the necessary knowledge and skills); Opportunity (O; all of the factors that lie outside of the individual that make the behaviour possible or prompt it); and Motivation (M; the brain processes that energise and direct behaviour). Combined, these interact to influence Behaviour (B), which in turn reciprocally influences the underlying components (COM). A given intervention might change one or more components in the behaviour system by selecting the intervention function(s) most likely to be effective in changing a particular behaviour (e.g. PA). These intervention functions can be further linked to more fine-grained and specific behaviour change techniques (BCT's, e.g. prompting goal setting, self-monitoring, and action planning) (11); strategies that focus directly on the change mechanisms identified in step 4 of the 6SQUID guide. You will notice if you explore the BCW, all of the intervention functions sit comfortably as part of the SEM.

With Sustrans' strategic decision to explore and diversify their funding options to include the social enterprise market, and specifically the prevention services within the health sector, IBC is being developed to target specific indices of health rather than transport related outcomes such as modal shift. This change requires slightly different, but complementary thinking regarding the determinants of PA: from more 'upstream' cycling and walking infrastructure change programmes targeting opportunities for active travel in adults (e.g. built environment modification such as the National Cycling Network or Community Street Design), to a more 'downstream' socio-psychological behaviour change approach, requiring volitional engagement of participants. IBC has a wider aim of influencing adult all-domain PA through direct (e.g. led cycles) and indirect mechanisms (i.e. processes that target intra/inter individual factors such as self-efficacy, social-relationships, knowledge acquisition, attitudinal change, and motivation) and should invest significant resources to explore these further. The SEM, 6SQUID guidance, and the BCW framework should be seen as complimentary resources and have an important role to play as part of the process of programme development. Indeed, an early literature review published internally by Sustrans in 2017 explored the potential of IBC being developed using the BCW framework as part of a 'light touch' intervention design. A worthwhile recommendation would be to revisit this review and ascertain the extent to which the structure provided by the BCW framework, and the findings from the review, have been integrated into the IBC programme activities. Of particular importance would be to examine the link between programme activities and their intended outcomes – i.e. are the programme activities likely to create the intended impact on all-domain PA?

In Chapter 2 we summarise the discussions at the three workshops. Chapter 3 summarises available data sources and presents a series of evaluation options. Chapter 4 provides a brief discussion of the evaluation and presents recommendations.

## Chapter 2: The Evaluability Assessment process

### WORKSHOP 1

Workshop 1 convened with general introductions of those in attendance, the EA process, and of the IBC programme itself. All except two attendees were employees of Sustrans, albeit operating from different departments – Behaviour Change, and Service Delivery. Those external to the organisation came from the NHS and independent consultancy.

Sustrans provided a draft Logic Model in advance of the session and this was used as the foundation for discussion. The main aim of Workshop 1 was to allow all stakeholders to engage in small group and wider plenary discussions about the main components of the IBC Logic Model, including the major inputs, programme activities, short, medium, and long terms outcomes, and to think through the mechanisms through which change may occur. From a facilitator perspective, it provided an opportunity to understand the programme in greater detail.

Following a number of productive discussions, there were a few important general questions raised, leading to amendments to the Logic Model:

1. In addition to the prior identification of physical activity, mental health (e.g. positive emotion and mood, self-efficacy, confidence and competency) and social well-being (connectedness, sense of place, and social isolation) were recognised as potentially important ‘primary’ outcomes to include
2. Careful consideration was given to the programme activities and the sense of how these would ‘map’ on to identified outcomes.
3. Initial questions were posed regarding the purpose of IBC evaluation? Was it to be an impact/effectiveness or feasibility and pilot evaluation?

### WORKSHOP 2

Workshop 2 continued the discussions from the first session, where the main aims were to clarify the purpose of the IBC evaluation, agree the key inputs, outputs, activities, and short-term outcomes of the programme, and begin the process of formulating the evaluation questions. Following a quick recap of Workshop 1, a large proportion of the session was dedicated to exploring the IBC programme in greater detail.

Six Primary schools have been identified in the Dumfries area and four have agreed to participate in IBC. The IBC will use school ‘Parent’s Evenings’ to recruit participants to the programme. IBC staff aim to have full engagement of at least three schools with approximately eight adults recruited in each site for the pilot project, with the programme lasting between 4 and 8 weeks depending on the participants recruited.

In Workshop 2 we learned more detail regarding the inputs and activities of the IBC programme. IBC have a number of local and national partners who will be assisting with certain components of the programme. These include, but are not limited to, local cycle shops helping with bike and E-bike rental, equipment hire and/or purchase; Dumfries station for hosting bikes; and strong volunteering, Active Schools, and Health Improvement teams to assist with the delivery of the programme.

In addition to the essential cycling skills as part of the Bikeability training (targeting competency, self-efficacy, perceptions of road safety), IBC will include resource provision (e.g. bike and equipment loan scheme for duration of the project), led rides, and leaflets/flyers promoting the benefits of PA (See Figure 1 below). Although IBC was originally developed to target both cycling and walking as health behaviours, the prominence of the walking component within IBC has been reduced in favour of the cycling provision, although walking promotion may still feature through the 'route planning' component of the programme and there is still potential to include led walks if appropriate.

The workshop also returned to the question whether IBC, given its current stage of development, scale and reach into the target population, was best served by a feasibility evaluation, or an impact/effectiveness evaluation.

### WORKSHOP 3

A number of conversations were required prior to Workshop 3 to address the outstanding question from Workshop 2 regarding the role and purpose of the IBC evaluation. This proved to be extremely valuable and as a result, the third workshop was able to focus on identifying 'feasibility' specific evaluation questions that could be taken forward and used in practice. Attendees discussed questions related to the feasibility of the programme design (e.g. adherence to the intervention, acceptability of the intervention, and the fidelity of the intervention delivery) and the feasibility of the evaluation design (e.g. bias in recruitment, recruitment rate and processes, selection of outcomes to be measured, and participant retention). By the end of Workshop 3, a number of potential evaluation questions were identified, and all attendees recognised the value of the session. Based on the revised logic model at the end of the first two workshops, it was agreed that the evaluation priority of IBC was a feasibility study of IBC as a pilot project. Chapter 3 will provide an elaboration of this based on the literature, and present evaluation options in this regard.

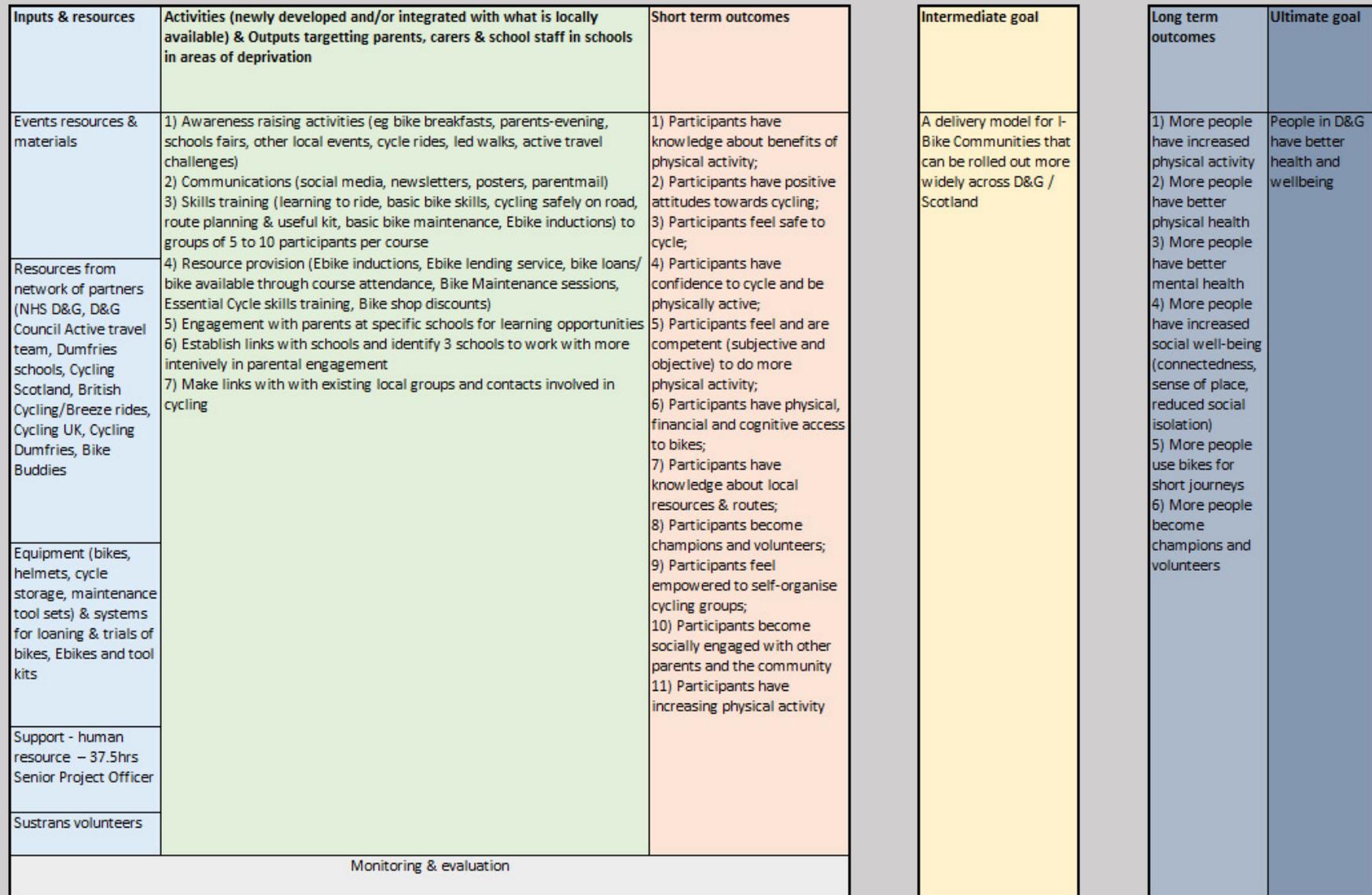


Figure 1. Revised I Bike Communities logic model

## Chapter 3: Evaluation options

### KEY ELEMENTS OF THE DEVELOPMENT AND EVALUATION PROCESS

One of the key messages from the current MRC Guidance on Developing and evaluating complex interventions (12) is that all stages in the process of developing, piloting, evaluating, reporting and implementing a complex intervention are important. Over-emphasising evaluation of effectiveness, to the neglect of adequate development and piloting work, or proper consideration of the practical issues of implementation, will result in weaker interventions, that are harder to evaluate, less likely to be implemented and less likely to be worth implementing.

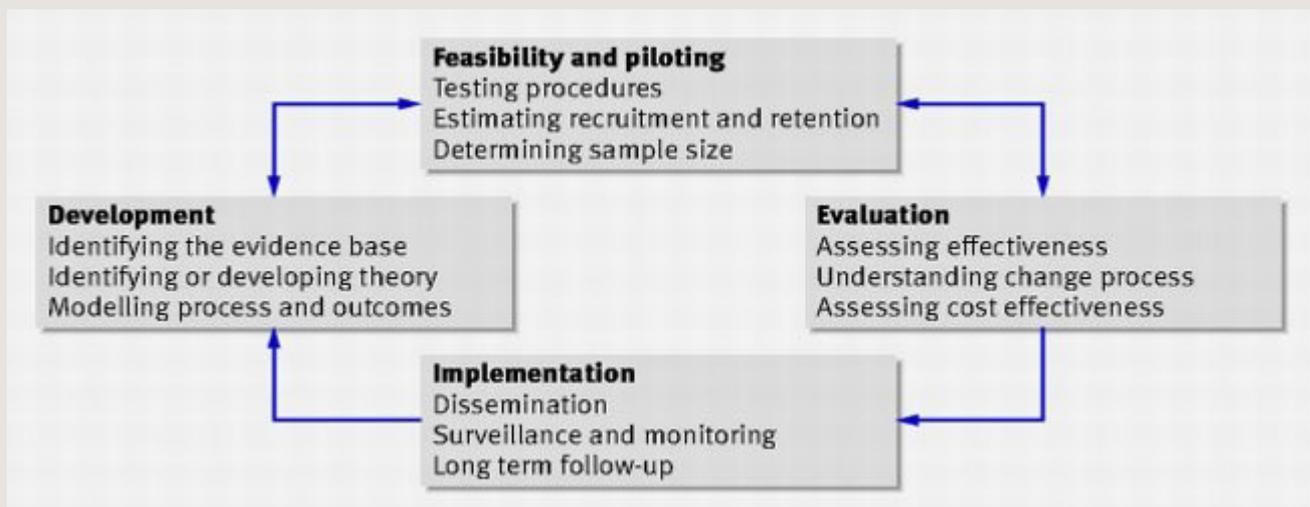


Figure 2. Key elements of the development and evaluation process (12, p8)

### THE NEED FOR A FEASIBILITY STUDY AND JUSTIFICATION

Evaluations are often undermined by problems of acceptability, compliance, delivery of the intervention, recruitment and retention, smaller-than-expected effect sizes, and so on, that could be anticipated by thorough feasibility testing (12). Research suggests that this vital preparatory work is often skimped. There is a movement towards greater consideration of feasibility and pilot work, in order to avoid wasteful investment in full-scale evaluations of interventions that have not undergone a systematic process of development and feasibility testing. Research funders, especially those in the health sector (for example National Institute for Health Research; NIHR<sup>1</sup>), expect to see evidence that a proposal has been systematically developed and is feasible to implement, before supporting studies of impact and effectiveness. Examples of programmes that have received funding following successful feasibility studies include the FfIT (13) and FRESH (14) studies.

Feasibility refers to the question “whether it is possible to do something” and a feasibility study “asks whether something can be done, should we proceed with it, and if so, how.” (15). Feasibility studies are particularly valuable where:

1 <https://www.nihr.ac.uk/funding-and-support/documents/funding-for-research-studies/research-programmes/PGfAR/CCF-PGfAR-Feasibility-and-Pilot-studies.pdf>

- Community partnerships need to be established, increased, or sustained;
- There are few previously published studies or existing data using a specific intervention technique;
- Prior studies of a specific intervention technique in a specific population were not guided by in-depth research or knowledge of the population's socio-cultural health beliefs; by members of diverse research teams; or by researchers familiar with the target population and in partnership with the targeted communities;
- The population or intervention target has been shown empirically to need unique consideration of the topic, method, or outcome in other research; or
- Previous interventions that employed a similar method have not been successful, but improved versions may be successful; or previous interventions had positive outcomes but in different settings than the one of interest.

IBC is being delivered for the first time in a new setting on a relatively small scale, and on the basis of promising but limited evidence from a previous evaluation. Important questions of feasibility need be addressed before the intervention can be implemented on a sufficiently large scale to enable testing of effectiveness.

Relationships with local community groups and schools are important for the delivery of IBC. While there are published studies on physical activity, behavioural change and the use of bicycles in interventions, they are not well reflected in IBC's programme theory. It has been well established that such interventions must be specifically designed for populations living in areas of deprivation. IBC draws on learning from BIUC2, a similar intervention delivered in London. A key question is whether the programme is transferable to the different context of Dumfries and Galloway.

Table 1 presents an overview of some key concepts used in feasibility studies that may be relevant to IBC.

**Table 1.** Key concepts in feasibility studies applied to IBC

| Concept                                | Questions  | Examples of outcomes   |
|--|--|--|
| Acceptability (also 'Appropriateness') | To what extent is IBC judged as suitable, satisfying, or attractive to program deliverers and recipients?                        | <ul style="list-style-type: none"> <li>• Satisfaction</li> <li>• Intent to continue use</li> <li>• Perceived appropriateness</li> <li>• Fit within organizational culture</li> </ul> |
| Adoption (also 'Uptake')               | To what extent is IBC likely to be used (i.e., how much capacity/demand is there among stakeholders and potential participants?) | <ul style="list-style-type: none"> <li>• Actual use</li> <li>• Perceived demand</li> <li>• Reach (which groups)</li> </ul>   |

|                   |   |  |
|-------------------|---|--|
| Implementation    | To what extent can IBC be successfully delivered to intended participants in some defined, but not fully controlled, context?   | <ul style="list-style-type: none"> <li>• Degree of execution</li> <li>• Success or failure of execution</li> <li>• Factors affecting implementation ease or difficulty ('barriers &amp; facilitators')</li> </ul>                          |
| Practicality      | To what extent can IBC be carried out with intended participants using existing means, resources, and circumstances and without outside intervention?   | <ul style="list-style-type: none"> <li>• Quality of implementation</li> <li>• Positive/negative effects on target participants</li> <li>• Ability of participants to carry out intervention activities</li> <li>• Cost analysis</li> </ul> |
| Adaptation        | To what extent does IBC need to be adapted to its new context?  | <ul style="list-style-type: none"> <li>• Degree to which similar outcomes are obtained in new format</li> <li>• Process outcomes comparison between intervention use in two populations</li> </ul>   |
| Evaluation design | <ul style="list-style-type: none"> <li>• How participants are identified, approached or recruited</li> <li>• How consent is obtained</li> <li>• What is the number of people in target population eligible for study?</li> <li>• What is the recruitment rate?</li> <li>• What kind of bias is there in recruitment?</li> <li>• What is the participant retention?</li> <li>• What are the data collection methods (mode, timing, etc)?</li> <li>• What is the completeness of data collection?</li> <li>• What is the selection of outcomes (study parameters)?</li> <li>• How study procedures work together</li> <li>• Which features of intervention context should be measured</li> <li>• What is the willingness of study sites to participate</li> </ul> |  |

Table adapted from Bowen *et al* (16) and GUEST Study (forthcoming)

## RELEVANCE FOR PROGRAMME FUNDING BODIES/COMMISSIONERS

We are unable to advise on service commissioners' (e.g. NHS Boards or Local Authorities) evidence requirements, as they are likely to differ markedly from organisation to organisation. We can however indicate what kinds of evidence a research funder would expect as a basis for supporting a full-scale effectiveness study. The National Institute of Health Research Public Health Research programme indicates that proposals should:

- Address an issue of major strategic public health importance, with the cost in line with the significance of the problem to be investigated
- Are likely to lead to changes in practice that will have a significant impact on a large number of the population across the UK
- Aim to fill a clear 'evidence gap', and likely to generate new knowledge
- Have the potential for findings that are generalisable and transferable

and should be developed in line with the MRC Guidance for the Development and Evaluation of Complex Interventions. The guidance emphasises the need for careful

feasibility testing prior to a full-scale effectiveness study, to establish that:

- The intervention is acceptable to participants, providers and other stakeholders
- The intervention can be delivered with fidelity to the protocol, or within defined limits of flexibility
- Participants can be recruited and retained in the study
- Outcome measures can be collected from a high proportion of participants

Increasingly, funders are also looking for early signs of efficacy, e.g. from other studies of similar interventions, and for evidence of how an intervention interacts with the context in which it is implemented, so that they can gauge whether it is likely to be transferable to other contexts as part of a larger scale effectiveness study. The feasibility study we have outlined aims to address each of these requirements.

## DATA SOURCES

Table 2 describes existing monitoring tools in Sustrans and comments on their relevance to the evaluation of the current IBC scheme in Dumfries and Galloway.

**Table 2.** Existing Sustrans monitoring tools and relevance to evaluation of IBC in Dumfries and Galloway

| Name                                 | Description   | Relevance to IBC   |
|--------------------------------------|---|--|
| I Bike teacher survey (Head teacher) | The survey is a mixture of quantitative and qualitative questions, asking about the impacts that have been seen due to the project with regard to travel habits, attitudes towards active travel, safety, and physical activity, as well as feedback on the positive and negative aspects of the project. | <b>HIGH</b> This is an important stakeholder group (head teachers) that IBC should seek to engage with and obtain data from especially in terms of overall feasibility of IBC (e.g. recruitment process) |
| I Bike partner survey                | The survey is a mixture of quantitative and qualitative questions, asking about the impacts that have been seen due to the project with regard to travel habits, attitudes towards active travel, safety, and physical activity, as well as feedback on the positive and negative aspects of the project. | <b>HIGH</b> This is an important stakeholder group that IBC should seek to engage with and obtain data from especially in terms of overall feasibility of IBC  |
| I Bike parent survey                 | The survey asks questions about both pupils' and parents' travel habits and attitudes in an attempt to find out about the indirect impact I Bike has on parents, as well as getting an idea of the barriers that stop parents from letting their children travel actively to school.                      | <b>HIGH</b> This is the main target group that IBC should seek to engage with and obtain data from especially in terms of acceptability of IBC   |

|                                   |   |  |
|-----------------------------------|---|--|
| Household survey (Adults only)    | Household surveys can be manually delivered or emailed to households directly impacted by Sustrans projects, such as Street Design, either before and after the project or upon completion of the work. Information captured includes views on: <ul style="list-style-type: none"> <li>• community engagement levels and resident's involvement in the project</li> <li>• perceptions of safety, traffic, parking, street appearance, litter and access</li> <li>• to what extent the Street Design project overcame problems highlighted by the residents</li> <li>• levels of active travel and perceptions of whether Street Design has enabled and encouraged more travel by active modes.</li> </ul> | <b>HIGH</b> This is the main target group that IBC should seek to engage with and obtain data from, especially on acceptability of IBC   |
| Household Travel Behaviour Survey | These include interviews and travel dairies and have been contracted out to ICM in the past.  | <b>HIGH</b> This is the main target group that IBC should seek to engage with and obtain data from, especially on feasibility of IBC   |
| Community engagement survey       | Community engagement surveys are designed to engage with the local community to understand how the work that Sustrans does impacts on community cohesion and liveability.   | <b>MID</b> This will involve most stakeholder groups and can help to gauge the acceptability of IBC  |
| Sustrans Volunteer feedback       | The survey asked volunteers about the activities that they were involved with as well as assessing their PA levels and discussing other potential benefits of volunteering.   | <b>MID</b> This is an important stakeholder group that may affect the delivery of IBC especially in terms of practicality  |
| I Bike Hands Up survey            | Additional Hands Up survey (pre and post intervention) data collected through the I Bike programme uses the same survey process as the Hands Up Scotland survey. Pre and Post intervention Hands Up surveys are conducted in classes to provide high response rates and ask questions about travel behaviour to school.   | <b>LOW</b> While relevant this is a pupil-only survey.   |
| Automatic cycle counters          | These counters provide valuable data on cycle usage over time. Data is collected from a network of automatic cycle counters across Scotland. Counters are typically inductive loop-based technology, recording continuous counts of cyclists on an hourly basis.  | <b>NIL</b> number of participants will be too small to be picked up; IBC not expected to have wider and measurable impact over time  |
| Route user intercept surveys      | The surveys count all users passing the survey site, intercepting as many as possible over the age of sixteen to be interviewed. A manual count is conducted concurrently with the survey, recording all movements for each user category (age, mode and gender).   | <b>LOW</b> Although number of participants are too small to be picked up and IBC not expected to have wider and measurable impact over time, The questionnaire on its own could be adapted to be useful tool with participants only. |

|                                 |   |   |
|---------------------------------|---|---|
| CCTV camera footage             | CCTV camera footage is used to understand cycling levels and traffic behaviour. Camera footage is used in a similar way to manual counts providing a snapshot of usage both before and after an intervention has been completed.  | <b>NIL</b> number of participants will be too small to be picked up; IBC not expected to have wider and measurable impact over time |
| Hands up Scotland Survey (HUSS) | The Hands Up Scotland Survey is an annual survey based on a large sample of pupils enrolled at schools in Scotland. The question asked in the Hands Up Scotland Survey is, 'How do you normally travel to school?' with the following response options: Walk, Cycle, Scooter/Skate, Park and Stride (driven part of the way by car and walk the rest), Driven, Bus, Taxi and Other. | <b>NIL</b> IBC is only targeted at schools in D&G   |
| Workplace travel survey         | Workplace travel surveys are designed to engage with staff within a particular workplace to understand how they currently travel to and from work, about their involvement with the project, any barriers which prevent them from travelling more sustainably, and demographic information.   | <b>NIL</b> The workplace is not the focus of IBC  |
| Challenge                       | The 'Challenge' is a web-based competition to get as many people walking, cycling and using public transport as possible for a whole month by logging all journeys which are not undertaken by car.   | <b>NIL</b> This is a tool designed for a specific campaign  |

Table compiled from Sustrans website resource<sup>2</sup>

## OVERVIEW OF OPTIONS

We recommend that the evaluation of the current I Bike Communities project should focus on issues of feasibility, to provide evidence that can be used to further develop the intervention, optimise delivery and inform larger scale implementation and evaluation. We present 4 options for evaluating the feasibility of IBC. This begins with the cheapest and simple option (0) and build on additional evaluation activity and cost.

<sup>2</sup> <https://www.sustrans.org.uk/sites/default/files/images/files/Scotland%20annual%20report%202015.pdf>

**Table 3.** Overview of options

| Evaluation Questions  | Evaluation Design   | Elaboration  | Data collection tools  | Pros  | Cons   |
|---|---|--|--|---|--|
| <ul style="list-style-type: none"> <li>To what extent do participants, schools and other stakeholders find IBC acceptable/ appropriate?</li> </ul>  | <b>Option 0</b> <ul style="list-style-type: none"> <li>Sustrans M&amp;E tools.</li> </ul>   | <ul style="list-style-type: none"> <li>Relies on existing M&amp;E. No additional evaluation.</li> </ul>  | Existing Sustrans M&E tools (unmodified)   | <ul style="list-style-type: none"> <li>No additional cost.</li> </ul>   | <ul style="list-style-type: none"> <li>Will not be able to assess feasibility.</li> </ul>  |
| <ul style="list-style-type: none"> <li>Can participants be engaged and retained in IBC?</li> </ul>  | <b>Option 1</b> <ul style="list-style-type: none"> <li>Modified Sustrans M&amp;E tools.</li> </ul>                                      | <ul style="list-style-type: none"> <li>Inclusion of questions addressing feasibility in existing tools.</li> </ul>   | Modified Sustrans I Bike Surveys (Teacher; Partner; Parent; Community engagement; Volunteer).  | <ul style="list-style-type: none"> <li>Can address some aspects of feasibility, such as Acceptability.</li> </ul>   | <ul style="list-style-type: none"> <li>Some additional cost.</li> <li>No perspective from implementers and volunteers.</li> </ul>  |
| <ul style="list-style-type: none"> <li>Can schools and other stakeholders be engaged in delivery of IBC?</li> <li>What modifications to IBC would help to improve engagement of participants, schools, and other stakeholders?</li> </ul> | <b>Option 2</b> <ul style="list-style-type: none"> <li>Option 1 + Additional qualitative &amp; quantitative data collection.</li> </ul> | <ul style="list-style-type: none"> <li>Option 1 + qualitative interviews with school staff, other stakeholders and participants; structured observations of programme delivery; Baseline &amp; follow-up participants survey.</li> </ul> | Modified Sustrans I Bike Surveys + Semi-structured interviews & Structured observations; Documentary analysis; IPAQ, SEPA, POMS2 Surveys | <ul style="list-style-type: none"> <li>Can provide a more comprehensive feasibility evaluation, including in-depth exploration of factors promoting or hindering delivery and engagement.</li> </ul>  | <ul style="list-style-type: none"> <li>More expensive than option 1.</li> <li>Requires some technical understanding of questionnaire administration, processing, and scoring.</li> </ul> |
| <ul style="list-style-type: none"> <li>What factors promote or hinder successful delivery of IBC?</li> <li>Which outcomes should be included in a future effectiveness study, and how should they be measured?</li> </ul>                 | <b>Option 3</b> <ul style="list-style-type: none"> <li>Option 2 + Novel data collection methods.</li> </ul>                             | <ul style="list-style-type: none"> <li>Option 2 + wearable technology.</li> </ul>  | Modified Sustrans I Bike Surveys + Qualitative & Quantitative data collection tools + activPAL (or similar device)                       | <ul style="list-style-type: none"> <li>Can address criticism of self-reported measurements of PA</li> <li>Provides high frequency detail regarding primary outcome (physical activity), including 'what'. 'where', and 'how much'.</li> </ul> | <ul style="list-style-type: none"> <li>Most expensive option.</li> <li>Requires strong technical understanding/ expertise of PA measurement, and GPS processes.</li> </ul>               |

## OPTIONS IN DETAIL

### Option 0: Existing monitoring & evaluation system

Option 0 comprises existing research and monitoring activity with no additional evaluation. We include this primarily as a reference point. As discussed above, existing research and monitoring activity will not address the evaluation requirements identified in the workshops. Option 0 may be able to address the short-term outcomes of IBC's logic model but will not be able to address the intermediate outcome of having a delivery mode of IBC that can be rolled out.

### Option 1: Option 0 + modifying existing monitoring and evaluation system

Option 1 comprises Option 0 with modifications to the existing data collection tools that Sustrans uses to monitor and evaluate its projects. The modifications propose the inclusion of questions addressing feasibility. Table 4 lists existing monitoring tools assessed as relevant in Table 2 earlier and discusses suggested modifications. We recognise that the inclusion of each of these tools may not be practical or 100% relevant. As such, we suggest borrowing from each of the existing surveys and modifying to reflect the needs of IBC. For instance, as parents are participants in the IBC programme, it may make more sense to extract specific questions from the IBike parent survey used in previous M&E work and append them to a modified 'Household Survey' specific for IBC. If 'Option 1' is thought to be the most appropriate approach, consideration should be given to including some open-ended questions targeting the physical activity behaviours of other household members (partners and children). These should be designed to provide useful data on secondary impacts of the IBC programme, allowing the design and development of measurement tools if IBC is taken to full-scale effectiveness trial (impact evaluation).

**Table 4.** Relevant Sustrans monitoring tools and suggested modifications

| Name                  | Description   | Modifications  |
|-----------------------|---|--|
| I Bike teacher survey | The survey can be a mixture of quantitative and qualitative questions, asking about the acceptability of the schools being involved as recruitment sites. These questions can relate to their experiences and resource investment.  | To be delivered to head teachers of each recruitment site.<br><br>To include questions addressing Acceptability (e.g. 'satisfaction'; 'Fit within organisational culture'); Adoption (e.g. 'Perceived demand') |
| I Bike partner survey | The survey is a mixture of quantitative and qualitative questions, asking about the impacts that have been seen due to the project with regard to travel habits, attitudes towards active travel, safety, and physical activity, as well as feedback on the positive and negative aspects of the project. | To include questions addressing Acceptability (e.g. 'satisfaction'; 'Fit within organisational culture')   |

|                                   |  |  |
|-----------------------------------|--|--|
| I Bike parent survey              | The survey asks questions about both pupils' and parents' travel habits and attitudes in an attempt to find out about the indirect impact IBC has on parents, as well as getting an idea of the barriers that stop parents from letting their children travel actively to school.  | To recognise 'participants' as the parents and include questions addressing Acceptability (e.g. 'satisfaction'; 'Reach'; 'Perceived appropriateness') and perceived health benefits or increased positive attitudes towards themselves; improved fitness |
| Household survey                  | Household surveys adapted specifically for participants can be delivered before and after IBC. Information captured includes views on: <ul style="list-style-type: none"> <li>• community engagement levels</li> <li>• perceptions of safety and traffic</li> <li>• levels of active travel and perceptions of whether IBC have enabled and encouraged more travel by active modes.</li> </ul> |  |
| Household Travel Behaviour Survey | These will also be adapted specifically for participants. To include interviews and travel dairies.  |  |
| Community engagement survey       | Community engagement surveys are designed to engage with the local community to understand how the work that Sustrans does impacts on community cohesion and liveability.  |  |
| Sustrans Volunteer feedback       | The survey asked volunteers about the activities that they were involved with as well as assessing their PA levels and discussing other potential benefits of volunteering.  |  |

## Option 2: Option 1 + commissioning additional data gathering

Option 2 comprises Option 1 plus the commissioning of additional qualitative data gathering to (1) pilot the use of outcome measures among participants that could be used in a future effectiveness study, and (2) identify and explore factors that promote or hinder delivery of IBC and engagement of participants.

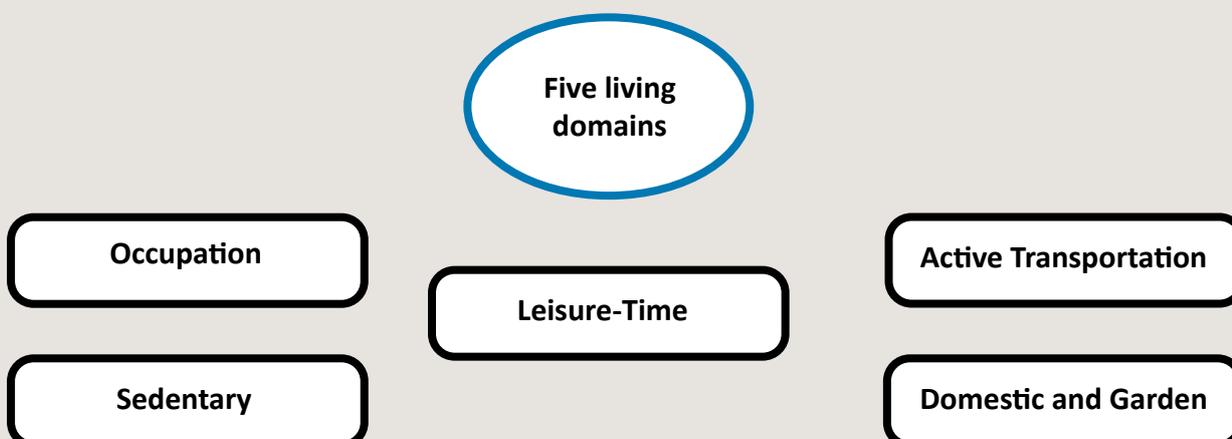
### Outcome Measure Development and Selection

The original main aim of IBC was to increase the levels of participant's leisure time physical activity. However, as part of the EA process, it was agreed that IBC has the potential to create a positive change across multiple domains of physical activity, and across indicators of mental health and well-being. Option 1 mentions the standardised data capture tools that Sustrans utilise in most programmes that they deliver. However, the specific IBC outcomes may require the identification of further data collection tools to capture these two primary outcomes:

#### *All/Domain-Specific physical activity data capture:*

The International Physical Activity Questionnaire (IPAQ; attached in Annex and here<sup>3</sup>) is a globally validated questionnaire that was developed in response to international demand for a standardised measure of PA.

There are two versions of the questionnaire, and both ask participants to recall their PA over the previous 7-days. The short version is suitable for use in national and regional surveillance systems and the long version provides more detailed information often required in research work or for evaluation purposes. From our understanding of the programme, its activities, and the proposed mechanisms through which they may create an effect, we would recommend the use of the long self-administered version. There is a possibility that IBC may not demonstrate clear and obvious increases in overall levels of PA, or across all domains; however, programme activities have a clear focus on leisure time and travel related PA (e.g. led bike rides, route planning, and as such may show domain-specific increases. These changes would be important to capture and record. The questionnaire takes roughly 15 minutes to complete but the potential 'burden' on participant time can be included as an evaluation question. This could be administered as part of the baseline and follow up household survey.



**Figure 3.** Five Living Domains of physical activity behaviour

3 <https://sites.google.com/site/theipaq/>

#### Potential 'continuous' outcome variables

- Walking MET-minutes/week for transport - domain-specific
- Cycle MET-minutes/week for transport - domain-specific
- Total PA MET-minutes/week – inclusive of all-domains
- MET = Metabolic Equivalent. The ratio of the work metabolic rate to the resting metabolic rate. One MET is defined as 1 kcal/kg/hour and is roughly equivalent to the energy cost of sitting quietly. Both walking and cycling have been given their own MET values (3.3 and 6.0 METs respectively) and these reflect relative energy costs of these activities compared to resting.

#### Potential 'categorical' outcome

- Algorithms use total volume of activity and number of sessions/days of activity to categorise participants (please see IPAQ scoring protocol for details).
- Low, Moderate, or High
- This is a useful variable to screen inclusion criteria (i.e. IBC wants to target those who are low-active).

**Figure 4.** Example outcome variables from IPAQ to be considered for measuring programme specific PA

### *Mental Health and psychological well-being data capture*

From our understanding of the programme, we believe that the 'active ingredients' of IBC target psycho-social constructs such as self-efficacy, competency, social-connectedness and relatedness, and psychological well-being. A number of methods can be used to capture these constructs and range from qualitative (e.g. structured 1-2-1 interviews or focus groups) to quantitative (progression through the levels of the Bikeability programme, and questionnaire administration). We break these down below:

#### Self-efficacy

Defined as "the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations"(17). This construct is all about your belief in your own abilities as it pertains to dealing with various situations – e.g. belief in your ability to increase leisure time PA through increasing the number of daily short cycling trips, even when the weather is bad.

#### How can it be measured?

The **Self-Efficacy for Physical Activity (SEPA) Scale** is a valid and reliable 5-item measure that assesses an individual's confidence for engaging in exercise in the presence of barriers (18) (see Annex). Response options are on a five-point Likert-scale, ranging from 'not confident' to 'extremely confident'. A summary score (range 1–5) is calculated by averaging the 5 items. Higher scores reflect higher levels of self-efficacy.

#### Competency

A basic psychological need of gaining mastery of a task and learning different skills (19). IBC programme activities will directly influence this construct as part of their cycling skills

provision.

#### How can it be measured?

- Progression as part of the Bikeability process
- Through interview or focus groups with questions developed specifically targeting skill acquisition as part of IBC.

#### *Social-Connectedness and relatedness*

Defined as a basic psychological human need to experience a sense of belonging and attachment to other people. Indeed, development of intrinsic motivation is more likely in contexts characterised by a sense of security and relatedness (19).

#### How can it be measured?

Scales have been developed to measure the extent to which our basic psychological needs (which includes both competency and relatedness) are, and have been, satisfied. However, for the purposes of IBC it may be much easier - and provide greater benefit – to integrate questions of this nature within a focus group or interview schedule. Thus, the data can be in the form of participant quotes surrounded by context and detail specific to IBC.

#### *Psychological Well-being (PWB)*

A recent systematic review of measures for psychological well-being in PA studies was published in June 2019 (20). PWB is a construct that can be defined and operationalised multiple ways and the literature is incomplete and unclear:

**Mental ill-being approach:** “The absence of distress, depression, and or other clinical symptoms” (21). Operationalised through the absence or low levels of mental ill-being (e.g. depression or anxiety).

**Hedonic approach:** focuses on maximising one’s feelings of pleasure and satisfaction with life. Can be operationalised through high levels of positive affect, low levels of negative affect, high levels of life satisfaction, and sometimes equated to happiness (22).

**Eudaimonic approach:** defined as actualising one’s human potential and formulating positive human functioning (23, 24). Usually operationalised as a set of six psychological domains: purpose in life, autonomy, personal growth, environmental mastery, positive relationships, and self-acceptance (24).

#### How can it be measured?

Multiple well-developed questionnaires are available. From our understanding of the programme it may be worthwhile investing in the ‘hedonic’ approach as discussions in the workshops spoke of IBC activities that would make participants feel happier and satisfied.

As such, a good option may be the Profile of Mood States (POMS) (25). Mood may be defined as a short-term feeling state that may fluctuate within minutes to days. In contrast to emotions, moods are more transient and as such are susceptible to change as a result of physical activity. POMS is a 65 item self-report psychological instrument intended for

use with adults age 18 and above. An updated version was published in 2012 by Multi-Health Systems, and the POMS 2. Evolving from the original, it has both short (35 item) and long (65 item) versions. The short and long versions should take approximately 3-5mins and 8-10 mins to complete respectively.

Respondents' rate each item on a "1" (not at all) to "5" (extremely) scale reflecting the respondent's mood over a specific period of time. Commonly used time frames include 'Today', 'Right Now', and 'This Week'. Other less commonly designated time frames have included *The Past Three Minutes, Since Taking Medication, and The Past Month*(26).

Example structure of questionnaire:

| <i>Directions: Describe HOW YOU FEEL RIGHT NOW<br/>by circling the most appropriate number after each of the words listed below:</i> |            |          |          |             |           |
|--|------------|----------|----------|-------------|-----------|
| <b>FEELING</b>   | Not at all | A little | Moderate | Quite a bit | Extremely |
| 1. Friendly  | 1          | 2        | 3        | 4           | 5         |
| 2. Tense   | 1          | 2        | 3        | 4           | 5         |

**Figure 5.** Example presentation of Profile Mood States items

There is a cost associated with purchasing the rights to use POMS and this can be found here<sup>4</sup>. As an example of costs, the POMS 2 kit - including POMS 2 manual, 25 POMS 2 Adult short (35 item version) questionnaires – would cost \$434 (US), with any additional questionnaires costing \$3.75 (US). These costings include automatic online administration, scoring, and report generation.

### Process Evaluation

Process evaluations aim to provide a detailed understanding needed to inform future programme delivery and practice (27). This is achieved through examining aspects such as:

- Implementation: the structures, resources and processes through which delivery is achieved, and the quantity and quality of what is delivered;
- Mechanisms of impact: how intervention activities, and participants' interactions with them, trigger change;
- Context: how external factors influence the delivery and functioning of interventions.

Process evaluation may be conducted alongside an effectiveness study, or as part of a feasibility study. Process evaluations within feasibility studies focus on the practicalities of delivering an intervention and ways in which intervention design and evaluation can be optimised for a future effectiveness study.

Key aspects of a process evaluation that addresses important concepts raised in Table 1 (Implementation, Practicality, Adaptation, Evaluation design) include:

- Planning: Carefully define the parameters of relationships with intervention

<sup>4</sup> <https://www.mhs.com/MHS-Assessment?prodname=poms2>

developers or implementers.

- Design and conduct: Clearly describe the intervention and clarify causal assumptions (in relation to how it will be implemented, and the mechanisms through which it will produce change, in a specific context).
- Analysis: Provide descriptive quantitative information on fidelity (i.e. whether the intervention was delivered as planned), dose (i.e. what were participants exposed to, e.g. number, length and content of sessions), and reach (how many people took part).
- Reporting: Report the logic model or intervention theory and clarify how it was used to guide selection of research questions and methods.

Methods for collecting process evaluation data include interviews with stakeholders, programme implementers, and participants; structured observations; and documentary analysis of relevant IBC materials.

- The relevant documents for documentary analysis will be any materials produced for the purpose of IBC D&G. This include programme design documents, publicity and participant recruitment materials, training materials (eg., trainers and participants manuals)
- Structured observations will be guided by an observation pro forma which will direct the observer to pay attentions to elements of IBC training programme delivery like fidelity (to programme training design), acceptability of facilities, behaviour and responses of trainers and participants etc.

Additionally, participants can provide self-reports of their overall opinion of IBC, their opinion of the intervention components and measurements, and suggestions for improvement using open-ended questionnaire responses and/or as part of the interview methods.

Other key components of the additional qualitative primary data gathering would include:

- Semi-structured interviews with other stakeholders involved in delivery or support of IBC, such as Dumfries and Galloway Active Travel team, local/national cycling groups, Sustrans volunteers, etc., to identify levels of engagement with IBC, perceptions of the value of the intervention and the feasibility of supporting IBC in the longer term.
- Semi-structured interviews with participants to identify reasons for participation and experiences of taking part, including level of engagement with the programme, individual, household and contextual obstacles and facilitators of participation, etc.
- Structured interviews with a subsample of participants to test the feasibility of using survey instruments such as SEPA, POMS, etc., to measure physical activity, mental health and wellbeing outcomes, and the use of wearable devices to objectively monitor changes in activity types and levels.

### **Option 3: Option 2 + Testing novel methods of data gathering**

Option 3 comprises Option 2 plus the addition of work to assess the feasibility of novel individual level data capture across a designated time period (for example, 7 days).

Self-reported measurements are often criticised for the potential introduction of recall bias, social desirability concerns, general misunderstanding of questions (28), and concerns over validity and reliability (29). Activity monitors are arguably more robust although studies using accelerometry also face methodological challenges (30). These should be considered and may require some technical expertise to guide through any decision-making process of which device(s) to choose.

Wearable technology such as activity and spatial monitoring devices (i.e. accelerometry and Global Positioning Systems (GPS) receivers) could be employed to record high frequency data of movement across space. The activPAL activity monitor<sup>5</sup>, for instance, is a small and unobtrusive device that can be applied to the mid-point of the thigh and worn by a user for the duration of a protocol (e.g. seven days). The latest versions of these devices offer the ability to extract postural classification behaviours (lying, sitting, standing quietly, stepping, running; see Figure 3) and now are also able to use the acceleration pattern to recognise cycling behaviour with good levels of accuracy. Devices and associated software can be costly. But there are a number of options available for this – including rental/loaning opportunities, thereby reducing initial outlay costs. The data extracted from even a small sample could be very useful, not least as a form of informative feedback to those who take part. The activPAL is applied to the thigh via double sided hydrogel. We would strongly suggest testing this with a small group of participants if you wanted to include a wearable like this. Other devices exist but the activPAL device is one of few that can extract cycling activities objectively through the combination of device placement and acceleration signal.

*PA related potential outcome variables of interest:*

- Average time spent sitting/standing quietly/stepping per day.
- These would adequately capture ‘all-domain’ or ‘total’ levels of PA change.

If worn in combination with GPS devices, IBC would be able to measure both individual levels of PA and where this occurred. These devices could also be used to classify sedentary behaviours into useful transport related outcomes such as car/bus/train travel. This option would be more expensive due to the initial outlay for the device and software cost (less costly if using a loan/renting system) but would provide substantially more detail in the primary outcomes of interest. Consideration should be given to technical expertise required to work with, process, and analyse this type of data. Expertise in Geographic Information Systems (GIS) Software would be essential.

N.B. If GPS devices are above and beyond the scope of the project cost, there would be benefit in integrating a transportation related spatial-temporal log, such as the household travel behaviour survey that participants complete as part of the baseline measures. Although not objectively classified, this would still allow for detailed analyses of the activPAL data, where journeys to and from work could be extracted (if even loosely timestamped) and analysed for pre-post change. Current methods for collecting mode and timing of occupation-related travel in Sustrans projects could be employed.

---

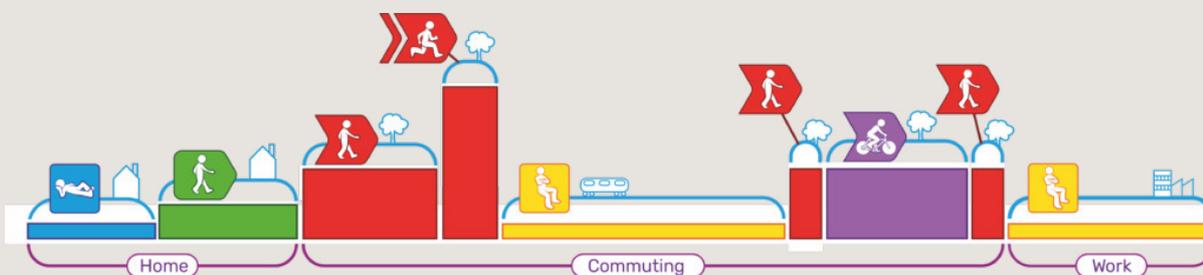
5 <http://www.palt.com/>

### *Combined PA and 'spatial' outcome variables of interest:*

- Average time spent in objectively classified active/passive travel modes per day.
- Average time spent in car and bus travel per day (Using GPS and activity monitor data).
- This approach could be used to extract domain-specific (leisure, transport, occupation, weekend) levels of PA.

### *Purpose of inclusion*

The introduction of wearable technology has a direct link to specific feasibility related evaluation design questions, such as: “what are the most appropriate outcome measures to employ, and which ones should we select?”; “Are the devices we want to use acceptable to the participants?”; “Are the devices easy to use and comfortable enough wear?”, and “Can participants wear them for the required time in order to extract useable data”. These questions can be answered through a combination of quantitative and qualitative approaches. As part of the programme delivery, participants could be provided with the devices to wear prior to the programme commencing (e.g. Week 0), immediately after the programme has been delivered (e.g. Week 8) and/or 3-months post-programme completion. From a quantitative perspective, device software can analyse the amount of time the devices have been worn, which will provide useful metrics of time, including when the devices are removed. More importantly, will be the addition of qualitative methods such as 1-2-1 interviews and/or focus groups, where some of the finer detail regarding feasibility constructs (e.g. acceptability, appropriateness, and compliance) can be explored.



**Figure 6.** Visual representation of the output that can be extracted from the activPAL activity monitor. Image courtesy of PAL Technologies material <http://www.palt.com/>

## Chapter 4: Recommendations

Implementation of IBC on a small scale in one community provides an excellent opportunity to gather evidence on how the programme can be optimised for further implementation and testing on a larger scale. It was agreed among workshop participants that evaluation of the current IBC scheme in Dumfries and Galloway should seek to address questions of feasibility that could be used to optimise the design and delivery of IBC and inform the methods that could be used in a future effectiveness study. These aims entail a mixed-methods approach to evaluation, corresponding to Option 3, and would gather and analyse qualitative and quantitative data on implementation processes and short-term outcomes for participants. Such an approach should seek to make use of existing data collection tools from Sustrans, but also build in new primary data gathering to fill the most important gaps.

### SUGGESTED FEASIBILITY STUDY DESIGN OUTLINE

Table 6 outlines an example structure of data collection, including tools, procedures, and target population to answer the specific questions proposed as part of this feasibility evaluation. This detail is represented as a timeline in Figure 7.

#### IBC inclusion criteria:

##### *How do we identify participants living in areas of high deprivation?*

The home postcode of IBC participants can be used to identify those who live in areas experiencing high levels of multiple deprivation. Using SIMD (2016), small area geographies called datazones are ranked across Scotland, from most (1) to least (6,976) deprived. No natural demarcation exists to define 'more deprived' and 'less deprived' but a common approach is to:

- Split the **national** dataset into 5 groups (quintiles) and include all participants if their home datazone is located in the bottom 2 quintiles (quintiles 1 and 2, representing the lowest 40% ranked datazones nationally).
- Dumfries and Galloway have 17 datazones in the most deprived quintile nationally, and 52 datazones in the 2<sup>nd</sup> most deprived quintile.

##### *How to identify 'low-active' participants?*

Baseline administration and subsequent scoring of the IPAQ questionnaire would allow potential participants to be screened as low, moderate, or high-active. Those who identify as low-active can then be assigned to either arm of the feasibility study.

#### Data collection tools and outcome measurement

Data collection tools will depend on which 'Option' is considered most appropriate for Sustrans and IBC, but can range from modified existing Sustrans surveys, semi-structured interviews, and 'wearables'. Outcomes should be assessed at baseline and follow-up at 3 months (time frame can be adjusted) upon completion of the IBC course on all participants and adult members in their household.

#### Indicative Costs

The full cost of conducting a feasibility study such as the one we present in this report

will depend on a number of factors, not least the ‘option’ chosen, and will vary according to the contractor chosen. Below we present an estimate for the major costs associated with Option 3. These are indicative costs, match the example structure as presented in Table 6, and should be used as a guide only. They do not include, for instance, costs associated with printing, consumables (e.g. envelopes), or postage or packaging if using a postal delivery service.

**Table 5.** Indicative major costs associated with Option 3

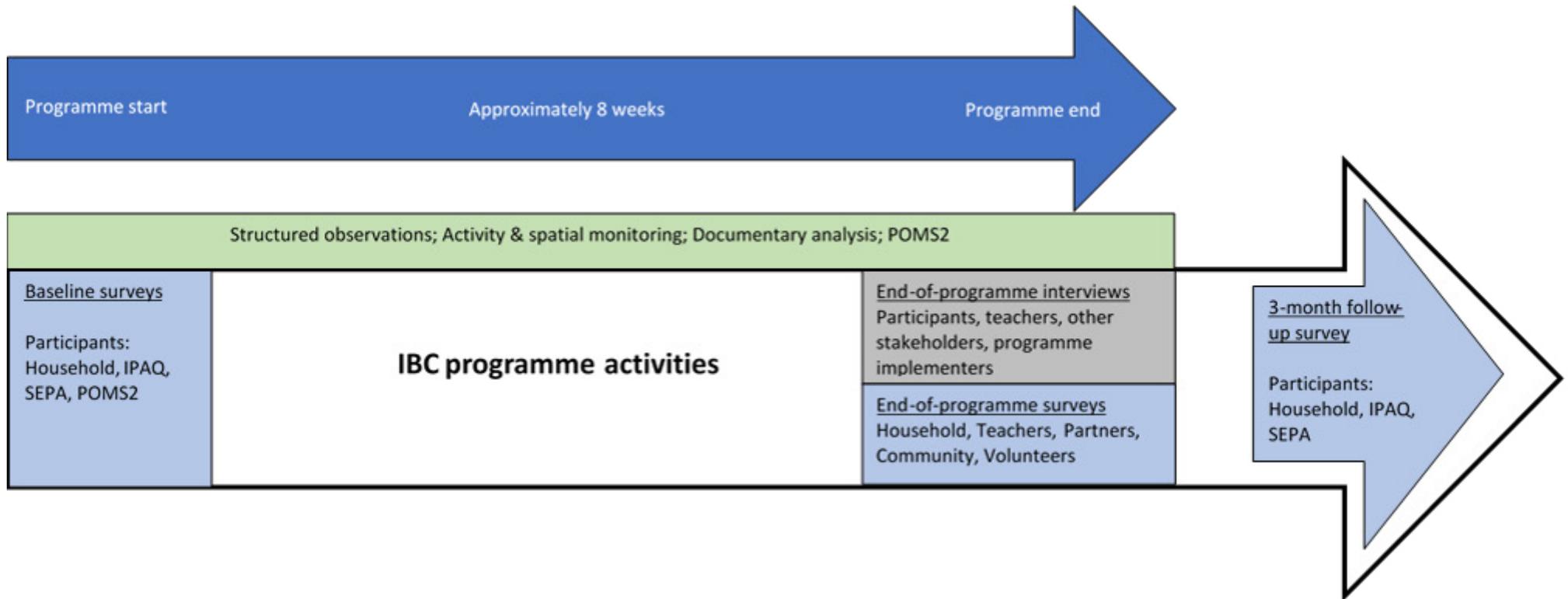
|  | Description   | Cost   |
|--|---|--|
| <b>Staff</b>                           |   |  |
| Research Associate (Grade 7, point 32) | 18-month position – perform all duties relative to development, implementation, and post programme activities | Salary - £81,700<br>Estate Costs - £10,900             |
| Fieldwork Assistance                   | Data management of activity monitoring devices (37.5 hours of time required)                                  | Salary - £700  |
| <b>Survey</b>                          |   |  |
| POMS 2                                 | POMS 2 manual, 25 POMS 2 Adult short (35 item version) questionnaires   | \$434 x 25 (US)<br>\$3.75 for additional questionnaire |
| <b>Interview</b>                       |   |  |
| Transcription services                 | Costs associated with transcribing interviews with study participants and stakeholders                        | Approx. £100/hour of interview material                |
| <b>Devices</b>                         |   |  |
| activPAL activity monitor              | Rental costs for pre/post measurement plus associated application materials                                   | £10/device for study duration                          |
| Electrode gel                          | 60g tube – used for applying device to thigh  | £3 per tube  |
| Alcohol swabs                          | To clean area of thigh before applying  | £1.50 per 100 swabs                                    |
| Opsite Flexifix                        | To waterproof the wearing of the device   | £12 (10cm x 1m)  |
| QStarz BT-Q1000XT                      | Rental costs for pre/post measurement and associated materials (pouches, charging cables)                     | £10/device for study duration                          |

**Table 6.** Example structure of data collection tools, procedures, and population target to answer feasibility questions for IBC (Option 2 and 3)

| Evaluation Questions  | Data collection tools  | Study Population  | Procedures   |
|---|--|---|--|
| <ul style="list-style-type: none"> <li>• To what extent do participants, schools and other stakeholders find IBC acceptable/appropriate?</li> <li>• Can participants be engaged and retained in IBC?</li> <li>• Can schools and other stakeholders be engaged in delivery of IBC?</li> <li>• What modifications to IBC would help to improve engagement of participants, schools, and other stakeholders?</li> <li>• What factors promote or hinder successful delivery of IBC?</li> <li>• Which outcomes should be included in a future effectiveness study, and how should they be measured?</li> </ul> | • Baseline & follow-up participants survey (including IPAQ, and SEPA questionnaires)*                        | Participants  | All participants to be administered questionnaire following recruitment and 3 months follow-up from completion of the course   |
|   | • Baseline administration of POMS2   | Participants  | Using 'Today' or 'Right Now' as time frame, questionnaire should be administered at baseline prior to 'intervention'   |
|   | • Modified I Bike teacher survey   | Teachers  | Questionnaire to be administered to teachers (up to 6; at least 2 from each school) after programme completion   |
|   | • Modified I Bike partner survey   | Programme partners  | Questionnaire to be administered to partners: at least 1 from each category of partner (funder, NHS, local authority etc) after programme completion                               |
|   | • Modified I Bike parent survey (combined with modified Participants' household and travel behavior surveys) | Participants  | Questionnaire to be administered to all participants at baseline and 3-month follow up   |
|   | • Modified community engagement survey   | Members of the local community in the catchment area  | Questionnaire to be administered to purposively sampled members (n= 10) of the community of recruited schools in the catchment area – after completion of the programme            |
|   | • Modified Sustrans volunteer feedback survey  | Volunteers  | Questionnaire to be administered to Sustrans volunteers (all should be invited to complete) – after completion of the programme  |
|   | • Semi-structured interviews*  | Participants, teachers, and other stakeholders, and programme implementers  | All participants (up to 24), all programme staff, head teachers (one from each recruitment site/school), other stakeholders (up to 6) to be interviewed after programme completion |
|   | • Structured observations  | Participants and trainers   | All programme training sessions to be observed using a structured observation pro forma  |
|   | • Post-activity administration of POMS2  | Participants  | Using 'Today' or 'Right Now' as time frame, questionnaire should be administered post programme activity such as led bike ride.  |
| • Documentary analysis  | Documents  | Programme development, recruitment, training, and other related materials   |  |
| • Activity and spatial monitoring devices (if integrated)   | Participants   | 24 hours/day, 7-8 day monitoring protocol for activPAL. Device is waterproofed using standard procedures and attached to the thigh. GPS device is worn via elastic belt around the waist or kept on person for the waking hours |  |

\* Participant surveys will focus on outcome measures only while interviews will focus on feasibility and contextual questions only. They can be designed such that both can be administered at the same time to reduce the burden on participants. Colours representing survey components (blue), interview components (grey), and ongoing data collections throughout IBC (green).

# I Bike Community programme



**Figure 7.** Example timeline of IBC feasibility monitoring and evaluation

Colours representing survey components (blue), interview components (grey), and ongoing data collections throughout IBC (green).

## References

1. Sustrans. Redbridge Bike It You Can Too. End of Project Report. Bristol; 2016.
2. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implement Sci.* 2011;6:42.
3. Schwartz J, Rhodes R, Bredin SSD, Oh P, Warburton DER. Effectiveness of Approaches to Increase Physical Activity Behavior to Prevent Chronic Disease in Adults: A Brief Commentary. *J Clin Med.* 2019;8(3).
4. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Educ Q.* 1988;15(4):351-77.
5. Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes.* 1991;50(2):179-211.
6. Jiang L, Yao S, Huang S, Wright J, Braciale TJ, Sun J. Type I IFN signaling facilitates the development of IL-10-producing effector CD8(+) T cells during murine influenza virus infection. *Eur J Immunol.* 2016;46(12):2778-88.
7. Sallis JF, Cervero RB, Ascher W, Henderson KA, Kraft MK, Kerr J. An ecological approach to creating active living communities. *Annu Rev Public Health.* 2006;27:297-322.
8. Campbell M, Fitzpatrick R, Haines A, Kinmonth AL, Sandercock P, Spiegelhalter D, et al. Framework for design and evaluation of complex interventions to improve health. *BMJ.* 2000;321(7262):694-6.
9. Wight D, Wimbush E, Jepson R, Doi L. Six steps in quality intervention development (6SQiD). *J Epidemiol Community Health.* 2016;70(5):520-5.
10. Zhang X, Speakman JR. Genetic Factors Associated With Human Physical Activity: Are Your Genes Too Tight To Prevent You Exercising? *Endocrinology.* 2019;160(4):840-52.
11. Abraham C, Michie S. A taxonomy of behavior change techniques used in interventions. *Health Psychol.* 2008;27(3):379-87.
12. Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M, et al. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ.* 2008;337:a1655.
13. Gray C, Hunt K, Mutrie N, Anderson A, Treweek S, Wyke S. Can the draw of professional football clubs help promote weight loss in overweight and obese men? A feasibility study of the Football Fans in Training programme delivered through the Scottish Premier League. *Journal of Epidemiology and Community Health.* 2011;65(Suppl 2):A37-A8.
14. Guagliano JM, Brown HE, Coombes E, Hughes C, Jones AP, Morton KL, et al. The development and feasibility of a randomised family-based physical activity promotion intervention: the Families Reporting Every Step to Health (FRESH) study. *Pilot and Feasibility Studies.* 2019;5(1):21.
15. Eldridge SM, Lancaster GA, Campbell MJ, Thabane L, Hopewell S, Coleman CL, et al. Defining Feasibility and Pilot Studies in Preparation for Randomised Controlled Trials: Development of a Conceptual Framework. *PLOS ONE.* 2016;11(3):e0150205.
16. Bowen DJ, Kreuter M, Spring B, Cofta-Woerpel L, Linnan L, Weiner D, et al. How we design feasibility studies. *Am J Prev Med.* 2009;36(5):452-7.
17. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol*

- Rev. 1977;84(2):191-215.
18. Marcus BH, Selby VC, Niaura RS, Rossi JS. Self-efficacy and the stages of exercise behavior change. *Res Q Exerc Sport*. 1992;63(1):60-6.
  19. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol*. 2000;55(1):68-78.
  20. Zhang Z, Chen W. A Systematic Review of Measures for Psychological Well-Being in Physical Activity Studies and Identification of Critical Issues. *Journal of Affective Disorders*. 2019.
  21. Ryan RM, Deci EL. On happiness and human potentials: a review of research on hedonic and eudaimonic well-being. *Annu Rev Psychol*. 2001;52:141-66.
  22. McDowell I. Measures of self-perceived well-being. *J Psychosom Res*. 2010;69(1):69-79.
  23. Waterman AS. Two conceptions of happiness: Contrasts of personal expressiveness (eudaimonia) and hedonic enjoyment. *Journal of Personality and Social Psychology*. 1993;64(4):678-91.
  24. Ryff CD. Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology*. 1989;57(6):1069-81.
  25. McNair DM, Lorr M, Droppleman LF. Manual for the profile of mood states. San Diego: Educational and Industrial Testing Service, EdITS; 1981.
  26. Searight HR, Montone K. Profile of Mood States. 2017. In: *Encyclopedia of Personality and Individual Differences* [Internet]. Springer, Cham Behavioral Science and Psychology.
  27. Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, et al. Process evaluation of complex interventions: Medical Research Council guidance. *BMJ : British Medical Journal*. 2015;350:h1258.
  28. Prince SA, Adamo KB, Hamel ME, Hardt J, Connor Gorber S, Tremblay M. A comparison of direct versus self-report measures for assessing physical activity in adults: a systematic review. *Int J Behav Nutr Phys Act*. 2008;5:56.
  29. Shephard RJ. Limits to the measurement of habitual physical activity by questionnaires. *Br J Sports Med*. 2003;37(3):197-206; discussion
  30. Silfee VJ, Houghton CF, Jake-Schoffman DE, Lopez-Cepero A, May CN, Sreedhara M, et al. Objective measurement of physical activity outcomes in lifestyle interventions among adults: A systematic review. *Preventive medicine reports*. 2018;11:74-80.

## Annex

# INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE – SHORT AND LONG VERSION

THE LAST 7 DAYS SELF-ADMINISTERED FORMAT FOR USE WITH YOUNG AND MIDDLE-AGED ADULTS (15-69 years)

The International Physical Activity Questionnaires (IPAQ) comprises a set of 4 questionnaires. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. The purpose of the questionnaires is to provide common instruments that can be used to obtain internationally comparable data on health-related physical activity.

### Background on IPAQ

The development of an international measure for physical activity commenced in Geneva in 1998 and was followed by extensive reliability and validity testing undertaken across 12 countries (14 sites) during 2000. The final results suggest that these measures have acceptable measurement properties for use in many settings and in different languages, and are suitable for national population-based prevalence studies of participation in physical activity.

### Using IPAQ

Use of the IPAQ instruments for monitoring and research purposes is encouraged. It is recommended that no changes be made to the order or wording of the questions as this will affect the psychometric properties of the instruments.

### Translation from English and Cultural Adaptation

Translation from English is supported to facilitate worldwide use of IPAQ. Information on the availability of IPAQ in different languages can be obtained at [www.ipaq.ki.se](http://www.ipaq.ki.se). If a new translation is undertaken we highly recommend using the prescribed back translation methods available on the IPAQ website. If possible please consider making your translated version of IPAQ available to others by contributing it to the IPAQ website. Further details on translation and cultural adaptation can be downloaded from the website.

### Further Developments of IPAQ

International collaboration on IPAQ is on-going and an ***International Physical Activity Prevalence Study*** is in progress. For further information see the IPAQ website.

### More Information

More detailed information on the IPAQ process and the research methods used in the development of IPAQ instruments is available at [www.ipaq.ki.se](http://www.ipaq.ki.se) and Booth, M.L. (2000). *Assessment of Physical Activity: An International Perspective*. Research Quarterly for Exercise and Sport, 71 (2): s114-20. Other scientific publications and presentations on the use of IPAQ are summarized on the website.

## INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE - SHORT (AUGUST 2002)

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

\_\_\_\_\_ **days per week**

No vigorous physical activities → **Skip to question 3**

2. How much time did you usually spend doing vigorous physical activities on one of those days?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

\_\_\_\_\_ **days per week**

No moderate physical activities → **Skip to question 5**

4. How much time did you usually spend doing moderate physical activities on one of those days?

\_\_\_\_\_ hours per day  
\_\_\_\_\_ minutes per day

Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

\_\_\_\_\_ days per week

No walking → **Skip to question 7**

6. How much time did you usually spend **walking** on one of those days?

\_\_\_\_\_ hours per day  
\_\_\_\_\_ minutes per day

Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

\_\_\_\_\_ hours per day  
\_\_\_\_\_ minutes per day

Don't know/Not sure

**This is the end of the questionnaire, thank you for participating.**



## INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE - LONG (OCTOBER 2002)

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** and **moderate** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

### PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

Yes

No



**Skip to PART 2: TRANSPORTATION**

The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, heavy construction, or climbing up stairs **as part of your work**? Think about only those physical activities that you did for at least 10 minutes at a time.

\_\_\_\_\_ **days per week**

No vigorous job-related physical activity



**Skip to question 4**

3. How much time did you usually spend on one of those days doing **vigorous** physical activities as part of your work?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads **as part of your work**? Please do not include walking.

\_\_\_\_\_ **days per week**

No moderate job-related physical activity



**Skip to question 6**

5. How much time did you usually spend on one of those days doing **moderate** physical activities as part of your work?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

6. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **as part of your work**? Please do not count any walking you did to travel to or from work.

\_\_\_\_\_ **days per week**

No job-related walking



***Skip to PART 2: TRANSPORTATION***

7. How much time did you usually spend on one of those days **walking** as part of your work?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

## PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

8. During the **last 7 days**, on how many days did you **travel in a motor vehicle** like a train, bus, car, or tram?

\_\_\_\_\_ **days per week**

No traveling in a motor vehicle



***Skip to question 10***

9. How much time did you usually spend on one of those days **traveling** in a train, bus, car, tram, or other kind of motor vehicle?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

Now think only about the **bicycling** and **walking** you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the **last 7 days**, on how many days did you **bicycle** for at least 10 minutes at a time to go **from place to place**?

\_\_\_\_\_ **days per week**

No bicycling from place to place



***Skip to question 12***

11. How much time did you usually spend on one of those days to **bicycle** from place to place?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

12. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time to go **from place to place**?

\_\_\_\_\_ **days per week**

No walking from place to place



***Skip to PART 3: HOUSEWORK,  
HOUSE MAINTENANCE, AND  
CARING FOR FAMILY***

13. How much time did you usually spend on one of those days **walking** from place to place?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

### PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the **last 7 days** in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or digging **in the garden or yard**?

\_\_\_\_\_ **days per week**

No vigorous activity in garden or yard



***Skip to question 16***

15. How much time did you usually spend on one of those days doing **vigorous** physical activities in the garden or yard?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard**?

\_\_\_\_\_ **days per week**

No moderate activity in garden or yard



***Skip to question 18***

17. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors and sweeping **inside your home**?

\_\_\_\_\_ **days per week**

No moderate activity inside home



***Skip to PART 4: RECREATION,  
SPORT AND LEISURE-TIME  
PHYSICAL ACTIVITY***

19. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

## PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the **last 7 days** solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **in your leisure time**?

\_\_\_\_\_ **days per week**

No walking in leisure time



***Skip to question 22***

21. How much time did you usually spend on one of those days **walking** in your leisure time?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like aerobics, running, fast bicycling, or fast swimming **in your leisure time**?

\_\_\_\_\_ **days per week**

No vigorous activity in leisure time



***Skip to question 24***

23. How much time did you usually spend on one of those days doing **vigorous** physical activities in your leisure time?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis **in your leisure time**?

\_\_\_\_\_ **days per week**

No moderate activity in leisure time



**Skip to PART 5: TIME SPENT SITTING**

25. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

## PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekday**?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

27. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekend day**?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

**This is the end of the questionnaire, thank you for participating.**

## SELF-EFFICACY FOR PHYSICAL ACTIVITY SCALE

| English   |               |                    |                      |                |                     |
|---|---------------|--------------------|----------------------|----------------|---------------------|
| <i>I am confident I can participate in regular exercise when:</i> | Not confident | Slightly confident | Moderately confident | Very confident | Extremely confident |
| 1. I am tired.  | 1             | 2                  | 3                    | 4              | 5                   |
| 2. I am in a bad mood.  | 1             | 2                  | 3                    | 4              | 5                   |
| 3. I feel I don't have time.                                      | 1             | 2                  | 3                    | 4              | 5                   |
| 4. I am on holiday.   | 1             | 2                  | 3                    | 4              | 5                   |
| 5. It is raining or snowing                                       | 1             | 2                  | 3                    | 4              | 4                   |

To find out more about the work of the MRC/CSO Social and Public Health Sciences Unit, visit [www.glasgow.ac.uk/sphsu](http://www.glasgow.ac.uk/sphsu)

MRC/CSO Social and Public Health Sciences Unit



The MRC/CSO Social and Public Health Sciences Unit, the University of Glasgow is jointly funded by The Medical Research Council (MRC) and the Scottish Government Chief Scientist Office (CSO). University of Glasgow charity number SC004401

