



THE UNIVERSITY *of* EDINBURGH

## Edinburgh Research Explorer

### Stand up for health

**Citation for published version:**

Tirman, L, Biggs, H, Morrison, K, Manner, J, Sivaramakrishnan, D, Baker, G & Jepson, RG 2021, 'Stand up for health: Programme theory for an intervention to reduce sedentary behaviour in contact centres', *Evaluation and Program Planning*, vol. 89, 102002. <https://doi.org/10.1016/j.evalprogplan.2021.102002>

**Digital Object Identifier (DOI):**

[10.1016/j.evalprogplan.2021.102002](https://doi.org/10.1016/j.evalprogplan.2021.102002)

**Link:**

[Link to publication record in Edinburgh Research Explorer](#)

**Document Version:**

Peer reviewed version

**Published In:**

Evaluation and Program Planning

**General rights**

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

**Take down policy**

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact [openaccess@ed.ac.uk](mailto:openaccess@ed.ac.uk) providing details, and we will remove access to the work immediately and investigate your claim.



**Stand Up for Health: programme theory for an intervention to reduce sedentary behaviour in contact centres**

Laura Tirman,<sup>1</sup> Hannah Biggs,<sup>2</sup> Kathleen Morrison,<sup>1</sup> Jillian Manner,<sup>1</sup> Divya Sivaramakrishnan,<sup>1</sup> Graham Baker,<sup>3</sup> Ruth Jepson<sup>1\*</sup>

<sup>1</sup> Scottish Collaboration for Public Health Research and Policy (SCPHRP), University of Edinburgh, 5 Forrest Hill, EH1 2QL, Edinburgh, UK

[ltirman@gmail.com](mailto:ltirman@gmail.com), [Kathleen.Morrison@ed.ac.uk](mailto:Kathleen.Morrison@ed.ac.uk), [Jillian.Manner@ed.ac.uk](mailto:Jillian.Manner@ed.ac.uk),

[Divya.Sivaramakrishnan@ed.ac.uk](mailto:Divya.Sivaramakrishnan@ed.ac.uk), [Ruth.Jepson@ed.ac.uk](mailto:Ruth.Jepson@ed.ac.uk)

<sup>2</sup> ScotCen, Scotiabank House, 6 S Charlotte St, EH2 4AW, Edinburgh, UK

[Hannah.Biggs@scotcen.org.uk](mailto:Hannah.Biggs@scotcen.org.uk)

<sup>3</sup>Physical Activity and Health Research Centre (PAHRC), University of Edinburgh, St

Leonard's Land, EH8 8AQ, Edinburgh, UK

[Graham.Baker@ed.ac.uk](mailto:Graham.Baker@ed.ac.uk)

**\* Correspondence:**

Ruth Jepson

[ruth.jepson@ed.ac.uk](mailto:ruth.jepson@ed.ac.uk)

**Author Contributions**

**Laura Tirman:** Conceptualization, Methodology, Investigation, Writing – Original Draft

**Hannah Biggs:** Investigation, Writing – Original Draft **Kathleen Morrison:** Investigation,

Writing – Original Draft **Jillian Manner:** Writing – Original Draft **Divya Sivaramakrishnan:**

Writing – Original Draft **Graham Baker:** Methodology, Supervision, Writing – Original Draft

**Ruth Jepson:** Methodology, Supervision, Writing – Original Draft

All authors have reviewed and approved the final manuscript.

## **Acknowledgments**

With many thanks to Ipsos MORI Scotland, especially Wayne Gilbert and Eilidh Gordon who made this research project possible. The initial idea for this project came from a MPH project by Audrey Buelo, Christina Katan, Laura Tirman, Florence Ashdown, Ruth Miller, and Isis Guerrero Castillo.

## **Conflict of Interest**

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Keywords: sedentary behaviour<sup>1</sup>, intervention development<sup>2</sup>, workplace<sup>3</sup>, contact centre<sup>4</sup>, physical activity<sup>5</sup>.**

## **Stand Up for Health: programme theory for an intervention to reduce sedentary behaviour in contact centres**

### **Highlights**

- Contact centre sedentary behaviour is a complex public health issue which needs addressing with complex interventions
- The most effective and sustainable complex interventions are developed with people, for people, using theory and systems-based approaches
- A six step intervention development model (6SQuID) was used to successfully develop a programme theory for an intervention to reduce sedentary behaviour in contact centres.
- The programme theory developed is effective, adaptive and transferable and currently being tested in stepped wedge feasibility study.

### **Abstract**

**Background:** Contact centre staff spend up to 95% of their day seated, which can lead to a range of negative health outcomes. The aim of this study was to develop a programme theory for a complex intervention to reduce sedentary behaviour in contact centres.

**Methods:** The 6SQuID model was used. A literature review, and focus groups at one contact centre were used to: understand the problem (step 1); identify modifiable factors (step 2); and develop a theory of change (step 3). A workshop shaped a theory of action (step 4), and the programme theory was refined after testing activities over 6 months (step 5). The intervention is currently undergoing further evaluation and feasibility testing in a larger scale stepped wedge randomised controlled study in 11 contact centres (Step 6).

**Results:** **Step 1:** Limited opportunity to sit less, and move more at work was identified as the main problem. **Step 2:** Modifiable factors were identified at four levels of the centre. **Step 3:** A theory of change was developed around cultural norms and individual behaviour change. **Step 4:** Actions were developed to ‘activate’ the theory of change. **Step 5:** Activities were implemented, and adapted over 6 months and the programme theory was refined.

**Conclusion:** The programme theory behind this intervention is robust, evidence based, adaptive and transferable.

## 1 Introduction

Sedentary behaviour refers to any waking activity characterized by an energy expenditure  $\leq 1.5$  metabolic equivalents and a sitting or reclining posture (Tremblay et al., 2017). Greater sedentary time in adults has been associated with an increased risk of cardiovascular and all-cause mortality, diabetes, cardiovascular disease and poor mental health (Chau et al., 2013; Cho, Hwang, & Cherng, 2012; Owen, Healy, Matthews, & Dunstan, 2010; Proper, Singh, van Mechelen, & Chinapaw, 2011; Rezende, Rodrigues Lopes, Rey-López, Matsudo, & Luiz, 2014; Thorp, Owen, Neuhaus, & Dunstan, 2011; Wilmot et al., 2012; Zhai, Zhang, & Zhang, 2015). Although physical activity can modify the associations between health risks and sedentary behaviour (Ekelund et al., 2019; Ekelund et al., 2016), health effects of sedentary behaviour are still evident even after controlling for physical activity (Biddle et al., 2019; Rezende et al., 2014; Santos et al., 2014; Thorp et al., 2011).

Workplace sedentary behaviour, and more specifically prolonged sitting, is placing a large burden on employers and the healthcare system. [Prolonged sitting is defined as sitting for 30 minutes or more \(Healy et al., 2012\).](#) Many employees working in office-based environments become exposed to prolonged periods of inactivity in static seated postures, which are enforced by factors such as ergonomic set-up and workplace culture (Straker, Coenen, &

Dunstan, 2016). This sedentary behaviour can significantly impact the daily lives and activities of workers. For example, musculoskeletal issues are one of the most prevalent occupational health problems for desk-based workers (Cho et al., 2012) and are a leading cause for disability worldwide (Hoy et al., 2014; Maher, Underwood, & Buchbinder, 2017; Vos et al., 2015). Estimates of the prevalence of musculoskeletal symptoms in computer users are as high as 50 per cent (Healy et al., 2012).

Working in a contact centre has been found to be associated with higher levels of sedentary behaviour than other office-based work (Thorp et al., 2012). Due to their occupational nature, contact centres are currently one of the most sedentary working environments, with some members of staff reporting up to 95% of their shift spent sitting. Environmental factors such as technology prevent contact centre staff from leaving their desk (Morris, Murphy, Shepherd, & Graves, 2018), and one in four members of contact centre staff regularly experience musculoskeletal problems with 22.4% of sick days lost to such problems (Office of National Statistics, 2017).

Current UK workplace legislation necessitate remedial ergonomic support for contact centre staff, only after a chronic or musculoskeletal condition has been diagnosed (Health and Safety Executive, 2003). There is a lack of policies from authoritative bodies that are specific to sedentary behaviour (Coenen, Gilson, Healy, Dunstan, & Straker, 2017). Given that contact centres are amongst the most sedentary workplaces (Thorp et al., 2012), and employees report higher levels of stress and depression compared with other desk-based work (Sprigg, Smith, & Jackson, 2003), it is key that preventative approaches are implemented, and workplaces take proactive steps to develop their own organisational policies which promote, opportunities for reducing occupational sitting time (Coenen et al., 2017). There is hence a need to develop interventions for reducing sedentary behaviour in contact centres, to ensure healthier working

policies are distributed equitably across all workplaces, not just those which have more worker autonomy and better working conditions.

Reduction of sedentary behaviour in contact centres requires a complex intervention which would consider the various interacting level and factors perpetuating a sedentary environment (Craig et al., 2013). The adoption of an intervention development framework is critical to understand and address the causal factors, and ensure that the programme is tailored to the needs of the centres (Craig et al., 2013). This project used the Six Steps in Quality Intervention Design (6SQuID) framework to develop the intervention (Wight, Wimbush, Jepson, & Doi, 2016). Using theory to develop complex public health interventions is crucial as it provides an understanding of what factors are leading to the health issue in the specific context, allowing appropriate intervention activities to be developed to interrupt the causal factors (Connelly, 2007; Craig et al., 2013). This innovative and collaborative framework allows for the development of interventions that are suitable to the target population. Other frameworks for intervention development, such as the MRC Developing and Evaluating Complex Interventions, PRECEDE-PROCEED Model, as well as Intervention Mapping, tend to be orientated towards individual behaviour change rather than organisation change and either provide little specific detail on intervention development or require significant skills and resources.

It has, to date, been used to develop a range of interventions including a family-based intervention to facilitate HIV testing (van Rooyen et al., 2016); a kinship care intervention (Hartley, McAteer, Doi, & Jepson, 2019); and an alcohol brief intervention in clinics for patients with symptoms of breast cancer. (Sinclair et al., 2020).

The framework consists of six steps:

Step 1. Defining the problem

Step 2. Identifying modifiable and non-modifiable causal factors

Step 3. Defining the theory of change

Step 4. Defining the theory of action

Step 5. Testing and refining the intervention

Step 6. Collecting evidence of effectiveness to justify evaluation and implementation

In addition to the six steps, the 6SQuID process incorporates three key points to consider when following the framework. The first is to maintain stakeholder involvement throughout the entire process, to encourage ownership of the problem and the solution. This is recognised as being crucial to developing acceptable and sustainable interventions (Wight et al., 2016). The second key point is to acknowledge the system within which the intervention is being developed. All interventions take place within a system that operates in a certain way and this can impact on the success of the intervention (Wight et al., 2016). In this study, the overarching system is the workplace which has complex layers of written and unwritten rules and policies, fixed resources and often rigid cultures. Contact centres have particularly rigid policies and failure to develop an intervention to take account of the systems will likely result in inadequate implementation, leading to failure of the intervention. The third key point is the consideration of the evaluation phase from the outset of development. The means by which an intervention will be evaluated should be considered during early phases of intervention development to ensure the process and intended outcomes are measured accurately and robustly. This study will report findings from the first five steps of the framework. The 6<sup>th</sup> step (evaluation) is currently taken place in another study.

## **2 Aims and Objectives**

The aim of the study was to develop a theory-based sedentary behaviour intervention for



contact centre workers, known as Stand Up for Health (SUH), using the 6SQuID framework.

The objectives were to:

1. Define and understand sedentary behaviour in the specific contact centre (6SQuID Steps 1 & 2)
2. Identify the non-modifiable and modifiable causal factors of sedentary behaviour in the contact centre (6SQuID Step 2)
3. Develop intervention activities and identify resources needed to target the modifiable causal factors (6SQuID Steps 3 & 4)
4. Introduce the activities with contact centre staff while refining the programme theory (Step 5)

### **3 Methods**

The 6SQuID framework was used to develop the SUH intervention with members of staff at a contact centre. A mixture of qualitative and quantitative methods were used throughout intervention development which are presented using the 6SQuID framework (Table 1). The intervention is in part based on two main theories: Social Cognitive Theory (Bandura, 2004) and the Social Ecological Model (SEM) (Centres for Disease Control and Prevention, 2020). The intervention also aims to create a sense of ownership to increase the likelihood of longer-term sustainability (Wight et al., 2016). While the SCT addresses many personal determinants and socio-environmental factors, the SEM takes the proposed multifaceted approach one step further to consider not only the individual and interpersonal levels, but to also consider the intervention at the organisational, environmental, and group level and takes into account the interactions between each of these. By targeting multiple levels of the workplace, Stand Up for Health aims to foster an atmosphere that will create a social norm within the office community to be able to sit and stand within the workplace. The SEM justifies and predicts

that Stand Up for Health’s multifaceted approach will be effective, acceptable, feasible and sustainable. We also take a systems based approach, by recognising that the implementation and sustainability of the intervention is dependent on how adaptive the control centre system is to change.

The intervention addresses the complex causal factors of sedentary behaviour by exploring the theories of change through a range of evidence-based activities (see Table 1). Whilst activities will vary depending on local context (e.g. office and work space set-up) there must be at least one activity from each theory of change included in the intervention. As an adaptive intervention, the fidelity of the intervention is to the theories of change rather than being prescriptive about activities that catalyse change. Additionally, it includes all employees from the start of development, with the aim of creating a social norm to be able to stand more at work. By gaining insight from contact centre staff about their specific needs, this approach is more likely to lead to a sustainable and effective intervention (Wight et al., 2016).

### **Table 1: Overview of framework and methods**

#### **3.1 Participants**

Participants were recruited from the Ipsos MORI contact centre in Edinburgh, Scotland. The researchers chose to work with one call centre to develop the programme theory, as this was a pilot study, and Ipsos MORI was chosen due to its large number of staff. The call centre had approximately 600 staff members ranging from ages 18 to 65. All staff in the contact centre were emailed by managers with an invitation to take part in focus groups. Interested participants were instructed to email the researchers with a chosen date and time that suited

them. The focus groups were conducted at the contact centre and £15 vouchers were given to each participant. Participants were given an information sheet, had the opportunity to ask questions, and gave written informed consent prior to taking part in the study. [Thirty-four](#) participants participated in one of five focus groups, and 31 participants returned a completed questionnaire. [Focus group participants ranged in gender, age, length of employment, and position held \(Table 2\). There is currently a multi-centre NIHR feasibility study exploring a wider range of participants.](#) The study was approved by the University of Edinburgh Centre for Population Health Sciences Ethics Committee.

## **4 Intervention development process**

The intervention development process followed the 6SQUiD framework.

### **4.1 Step 1: Defining the problem**

A range of data sources was used to define the problem and understand the contributory factors: existing literature, a sitting questionnaire, and qualitative data.

#### **4.1.1 Literature review**

Review level evidence was assessed in order to understand the needs of this population. Evidence on the impact of sedentary behaviour, causes of sedentary behaviour in the workplace, and existing sedentary behaviour interventions in workplaces and contact centres were examined. Key themes were identified and used to inform the focus group discussions.

#### **4.1.2 Occupational Sitting and Physical Activity Questionnaire**

Members of staff were invited by email to complete an adapted version of the Occupational

Sitting and Physical Activity Questionnaire (OSPAQ) prior to the focus group to determine levels of sedentary behaviour (Chau, Van Der Ploeg, Dunn, Kurko, & Bauman, 2012). They were asked to identify the number of days and hours worked in the last 7 days and to indicate the proportion of that time they thought had been spent sitting, standing, walking or carrying out heavy labour. The questionnaire was adapted to then allow participants to indicate which proportion of their time they desired to spend sitting, standing, walking or carrying out heavy labour over the same time period. After 3 months of intervention activities, a follow-up questionnaire was issued following the piloting of intervention activities to capture any changes in the participants' self-reported time spent doing each of these activities in the past seven days. A descriptive analysis was undertaken.

#### **4.1.3 Qualitative Focus Groups**

The focus group topic guide was developed to gain an understanding of the contact centre context, and staff perceptions on causes of sedentary behaviour in the workplace. Questions included, 'what does workplace health mean to you?', and 'please describe any previous workplace health activities within which you have taken part'. The topic guide was tested in a mock focus group at the Scottish Collaboration for Public Health Research and Policy for further refinement prior to being used in the contact centre. The focus groups were audio recorded and then transcribed. Inductive thematic analysis was used to code the focus groups and identify themes and sub-themes emerging from the data (Braun & Clarke, 2006). This involved becoming familiar with the focus group manuscripts, generating initial codes and recording them in excel, generating themes based on the codes, reviewing the themes to ensure they reflect the important parts of the data, defining and naming the themes, and finally collecting quotes to illustrate the themes within the paper. Two researchers independently coded three manuscripts and generated initial themes and their descriptors by consensus. An

additional two researchers reviewed the themes, which were generated to check for validity. Themes included ‘workplace norms’, ‘consistent communication’, and ‘importance of workplace health.’

#### **4.2 Step 2: Identify which factors can be modified**

Based on the data from the review of evidence and qualitative focus groups, factors leading to sedentary behaviour in the contact centre were identified before investigating which of these were potentially modifiable. Modifiable factors with the greatest scope for change were then considered in order to identify which factors should be targeted through intervention activities.

#### **4.3 Step 3: Defining the theory of change: Understanding the change mechanisms**

Following the focus groups, a workshop was held at the Ipsos MORI contact centre where all staff members were invited to drop in, try out equipment, participate in mindfulness activities like colouring, jigsaw and Lego, and then tell us about their preferences. Thirty-six staff attended the workshop. The workshop activities were chosen by the research team based on feedback from the focus groups, and whether the activities were associated with one of the four levels from the socioecological framework leading to sedentary behaviour (individual, social/community, environmental, and organisational). The workshop included equipment such as standing desk risers, a treadmill, a desk bike, exercise bands, stepper machines, exercise bands and more. Staff at the workshop rated pieces of equipment and individual and social activities they were interested in through a prioritisation exercise by placing sticky dots next to names of activities on flipcharts. The research team provided ideas to support the exercise, suggesting individual activities such as goal setting, taking the stairs, and walking or cycling to work. They also suggested social activities such as group competitions, group exercise classes, and other social events. The research team used the findings from the prioritisation activity to inform the final decision of which activities were to be implemented.

This decision also took into account the context of the contact centre (e.g. centre layout, work-time flexibility, budget and resources available) and the requirement to follow the programme theory, implementing activities that target sedentary behaviour at each level of the centre (individual, social/community, environmental, and organisational). Lastly, a logic model to illustrate the theory of change was developed. The intervention would focus on this change theory, rather than being prescriptive about activities that catalyse change.

#### **4.4 Step 4: Defining the theory of action: Clarify how the mechanisms of change will be delivered**

Once the specific intervention activities were chosen based on the focus groups and the workshop, the researchers identified the available inputs and resources that would be needed to deliver the intervention activities. This involved examining focus group data to determine what resources already existed in the contact centre, and what additional resources were needed. Workshop discussions also helped the researchers identify how the intervention activities could be implemented.

#### **4.5 Step 5: Testing and refining the intervention**

The researchers attended the first two wellness committee meetings to help guide the contact centre staff in establishing goals for the programme. Based on these meetings and the gathering of feedback from centre staff post-implementation, the intervention activities were adapted throughout the 6 months. The programme theory was refined based on this information, however more formal testing will be taken forward as part of subsequent work. A follow-up adapted Occupational Sitting and Physical Activity Questionnaire (OSPAQ) was administered after intervention activities had been running for 12 weeks; however, the follow-up questionnaire was only completed by 12.9% of participants so these results have been discounted for the purpose of this paper. [See Figure 1 for a timeline of intervention](#)

implementation and evaluation.

[Figure 1. Timeline of intervention implementation and evaluation]

## **5 Results**

### **5.1 Participants**

Five focus groups were conducted with a total of 34 participants at one call centre. They consisted of call handlers, supervisors and managers. Thirty-one participants returned the questionnaires with an approximate 50/50% split between males (n=15) and females (n=16). The results for each step of the 6SQuID framework are presented below.

### **5.2 Step 1: Define and understand the problem and its causes**

#### **5.2.1 Review of Evidence**

We identified no reviews that sought to understand the underlying causes or contributory factors for sedentary behaviour in the workplace, so we examined individual studies. The most relevant (Morris et al., 2018) reported that many call handlers often report stressful work environments due to low workplace autonomy, strict supervision of individual performance and commission-based salary systems. Contact centre agents have voiced concerns over job security, performance monitoring and a desire for increased autonomy over their working practices as influential factors for their motivation to participate in strategies to reduce sedentary behaviour in the workplace (Morris et al., 2018). However, organisational pressures to maintain high levels of productivity and meet targets frequently work against organisational investment into health and physical activity programmes within some contact centres. This is often due to perceptions that these activities will reduce the agents' call making time and lead to productivity losses (Renton, Lightfoot, & Maar, 2011). Encouraging call agents to move

more and sit less may be viewed by leaders and senior staff as conflicting with promoting productivity and targets (Morris et al., 2018). Moreover, a lack of awareness among contact centre agents, team leaders and senior staff of sedentary behaviour as a risk factor for poor health has been reported as a factor contributing to sedentary behaviour (Morris et al., 2018). Studies also report a low level of knowledge of guidelines and recommendations relating to sedentary behaviour and physical activity among staff, with no reflection of this in organisational policies (Coenen et al., 2017; Morris et al., 2018).

### 5.2.2 Occupational Sitting and Physical Activity Questionnaire (OSPAQ)

31 contact centre staff completed the OSPAQ questionnaire, and results are presented in Table 3. Respondents reported that the average time spent working during the previous seven days was 33.9 hours (Std dev: 14.7 hours) over a period of 4.3 days (Std dev: 1.6 days).

An association between self-reported sitting time and employment duration shows that newer members of staff report the highest levels of sitting time. Staff members working at the contact centre for up to 3 years reported the highest proportions of sitting time (<1 year: 80%; 1-3 years: 79%), and staff employed for 5 or more years reported the lowest proportions of sitting time (5-10 years: 70%; >10 years: 64%). OSPAQ results indicate that on average, employees spend 73.9% of their working day sitting, with a desire to sit only 48.4% of their working day. With an average working day of 7.8 hours, that means employees are sitting around 5.8 hours per day and desire to sit only 3.8 hours per day (Table 3). This data demonstrates participants overall desire to reduce daily sedentary behaviour by two hours per individual in the contact centre. Without any prior knowledge of the planned SUH intervention or similar workplace activities, respondents in all employment duration categories reported an overall desire to reduce daily sedentary behaviour significantly, and to spend more of their time standing,



walking or doing other non-sedentary activities. Although not enough respondents completed the questionnaire to draw conclusions on each specific duration of employment category, and age, understanding the actual versus desired sitting time was helpful for intervention development.

### 5.2.3 Qualitative Focus Groups

The researchers conducted five focus groups with a total of 34 participants. These focus groups helped to define and understand the specific causes of sedentary behaviour in the contact centre, and were later used to identify modifiable and non-modifiable factors for implementation. Themes identified through focus group data have been grouped into four levels of the contact centre by the researchers: individual, social/community, structural environment, and organisational. The focus group data is highlighted below. FG refers to Focus Group (and number), M or F refers to male or female (and number).

#### 5.2.3.1 Individual

At the individual level, factors leading to prolonged sitting included stress, lack of motivation, lack of knowledge about sedentary behaviour, pre-existing health problems, self-perception of health, perception of having no control of health at work, and fatigue.

*'Because when you do get a bit of a crash in the afternoon, or people get stressed, or people get bored, or whatever, everybody will head through for, like, chocolate, crisps, just that kind of thing, to give them a bit of a pick-up, and then they're back sitting down again.' FG 1, F2*

*'Plus also I suppose it depends how energetic you're feeling. The more energetic you are the more productive you'll be, and if you're having like a...if you're feeling tired mostly your production rate's going to go down.' FG 4, M1*

### **5.2.3.2 Social/Community**

Based on focus group information and previous literature, factors leading to sedentary behaviour on the social/community level were co-worker behaviour and workplace pressures that foster sitting.

*'This is my only job, so it's like I need the shifts. So it's like I don't want to mess up not getting shifts because maybe my idle time has been too long or something. I will get up, I will go make a cup of coffee, I'll go obviously to the toilet and things like that. But I try not to stay away from my desk for too long. Even though I have been told take a walk, just take five minutes or what not. But I still feel as if it'll reflect on my idle time.'* FG 5, F6

### **5.2.3.3 Environmental**

At the structural environment level, factors identified were related to ergonomic setup and a strict work schedule, such as having limited breaks, a need to be at one's desk, and a perceived need to be seated while working.

*'When people on the phone are interviewing they have to be sitting to do it because they're using a keyboard as well. And it's pretty impossible to use a keyboard when you're standing up. Because strike rate is a really important part of the job when you're interviewing and idle time is noted.'* FG 4, F5

### **5.2.3.4 Organisational**

Participants expressed high sitting time in the workplace due to the nature of contact centre work, and pressure to be profitable.

*...You should pretty much be sitting down for 100% of the time, you know, on the phone.'* - FGI, M1

*'...we're constantly aware of the profitability of our project, and how much pressure we're under, to make as much profit on every project... I think the biggest barrier [to the intervention] that you're going to find in this place is the pressure we are under to be profitable.'* - FG 3, M4

The transient nature of the work was also highlighted as a potential barrier to workplace health. With high turnover, staff may not invest in workplace health activities and the intervention may have less of a chance of being sustained in the long term. It was also evident that previous healthy initiatives or activities seemed to fade, making it potentially difficult to maintain workplace health promotion activities like SUH.

*'...things happen for a while and then they just fade away and they're replaced with something else and then they fade away.'* FG 4, M4

*'I think it is because the transient nature of the work. It's not even a part time job, it's casual work. So you see people and they never come back. So the turnover is huge.'* - FG 4, M4

### **5.3 Step 2: Identify the modifiable and non-modifiable factors**

Based on previous literature and data from the focus groups, modifiable and non-modifiable factors leading to sedentary behaviour in the contact centre were identified and presented in a fishbone diagram (Figure 2).

## [Figure 2: Fishbone diagram of modifiable and non-modifiable factors]

### 5.3.1 Individual

Modifiable factors include knowledge of the health risks of sedentary behaviour, motivation and control over health within the workplace. [Non-modifiable factors included pre-existing health problems.](#)

### 5.3.2 Social/Community

Workplace norms and co-worker behaviour were significant modifiable factors. Additionally, the culture within the workplace around break taking was seen as another major factor.

### 5.3.3 Environmental

The norm of seated, desk-based working was seen as a factor which could be easily modified by the researchers through the provision of various activities which the researchers would help the centre to develop.

### 5.3.4 Organisational

Within the centre, little funds were put towards ergonomic support. However, the researchers saw this as an opportunity to evidence the benefits of such items and thus labelled it as a modifiable factor. Additionally, a lack of structure for workplace activities was seen as modifiable. [Non-modifiable factors included central online supervision of individual performance, performance-based productivity and productivity targets set by the organisation.](#)

## 5.4 6SQuID Step 3: Developing a theory of change

Developing a theory of change involved developing intervention activities to target each modifiable factor leading to sedentary behaviour. This step details how each modifiable factor identified in step 2 could be addressed at each level of the contact centre by designing specific activities informed by the focus groups, literature review and workshop data. The literature review, identified a number of systematic reviews of workplace interventions to increase physical activity and reduce sedentary behaviour (Hutcheson, Piazza, & Knowlden, 2016; Shrestha et al., 2018; Smith et al., 2016; Straker et al., 2016). Most recently a systematic review of environmental interventions in workplaces (e.g., sit-to-stand desks) found evidence of significant reductions in sedentary behaviour in 14 out of 15 studies (Hutcheson et al., 2016). The most effective interventions were multi-component interventions targeting more than one level of the socio-ecological framework. In 2016, a systematic review assessed the effectiveness of white-collar workplace interventions to reduce sedentary time (Chu et al., 2016). It also found that multi-component interventions had the greatest effect. Both concluded a need to assess whether policy-based measures or organisational changes could further increase effectiveness. Stand Up for Health is designed to have organisational change as a key component of the intervention. A recent UK NIHR-PHR funded study found that Stand More AT (SMArT) Work intervention was effective in reducing sitting time of office workers within an NHS workforce using height adjustable workstations, self-monitoring tools and behaviour change techniques (Edwardson et al., 2018; Munir et al., 2018).

We found no reviews of interventions to reduce sedentary behaviour specifically in contact centres. The use of sit-stand desks and ergonomic awareness, as well as multi component work place interventions are effective in increasing physical activity and decreasing sedentary behaviour in contact centres (Morris et al., 2019; Straker, Abbott, Heiden, Mathiassen, & Toomingas, 2013).

From the focus groups, we identified the following potential theories of change, which we categorised as individual, social, environmental and organisational.

#### **5.4.1 Individual**

During the focus groups, staff spoke about how learning more about the benefits of sitting less could motivate them to make personal changes. Awareness of health benefits seemed to be an important step in changing individual behaviours.

*'I think doing this [SUH] would motivate me a bit, learning a bit more about it. So I think yeah, I do actually sit down a lot thinking about it. And telling people what are the benefits, having a bit of awareness of it actively helps.'* FG 5, M1

Several staff mentioned setting personal goals related to work or physical activity. For example forming a habit of moving or stretching once achieving a certain work goal, or setting a goal of completing a physical activity behaviour on its own.

*'Quite often, I do get up and stretch my legs, after I have achieved a certain [goal]... and I've done that for years. ...that is a habit, or routine that I have.'* FG 1, F3

Based on staff's desire to set personal goals and learn more about the benefits of reducing sedentary behaviour, as well as previous literature that supports goal setting in achieving behaviour change, the intervention included personal goal setting sheets along with educational materials and posters to satisfy the 'individual' level activities (Locke & Latham, 1990, 2002).

#### 5.4.2 Social/Community

At the social/community level, staff expressed interest in workplace competitions since that was already a common mindset in the contact centre.

*'I think challenges would work quite well, because that's pretty much how MORI works, you know, we're all challenged to hit strike rates, and then, and have a certain grade. So you find there is that slightly competitive nature amongst the employees, here. Some maybe competitive, some not, but it's there. So it may be interesting to have some kind of challenge involved, as well.'* FG 1, Pg. 20, M2

Influence from others was also seen as being a facilitator to increasing awareness of health at work. The following quote demonstrates the understanding that culture change may take time but that co-worker influence may help activities be built into the workplace norms.

*'The process of cultural change is you build momentum in that you get a few people's interest and then everyone else gets a bit curious and then you build it up so I think you have to step into it and take the first steps and then if you build that encouragement from other people saying, you know, maybe if other people are doing yoga class and then the other people will say, oh, that looks like fun, we'll do it. And then you build momentum through volume of people until it's no longer an intervention, it's the norm.'* - FG 2, M2

Based on these data, SUH recommended and encouraged the introduction of group activities and competitions such as group stretching, table tennis tournaments, yoga classes, and lunchtime walks.

### **5.4.3 Environmental**

Ergonomic set-up was discussed as a factor leading to sedentary behaviour, but recognised as one that could be changed to reduce sitting in the workplace.

*'...and you can even type standing up, leaning over. But just so you're physically able to continue the call, and move more. And move, even if it's just moving your chair back and forth, you know, a couple of feet, just to move your legs that might be beneficial.'* - FG 1, M1

*'If there were standing desks, and you could still be doing the exact same thing that you were doing, but standing.'* - FG 3, F2

*'I would be very happy with a standing desk, I think that would get me on my feet. And even if you're not actually walking about, if you're on your feet, you're kind of like, shuffling about, well, I kind of like shuffle about, or move about. So I could kind of see standing desks would be good.'* - FG 3, M4

Based on staff's interest in stand-up desks and other equipment aimed at sitting less, along with literature to support the use of such ergonomic set-up to reduce sitting, the researchers introduced standing desks, a stair stepper, a treadmill desk, a bike, and other environmental changes to encourage less sitting at work (Straker et al., 2016).

### **5.4.4 Organisational**

Lastly, organisational change was discussed in the focus groups as a key level for the intervention to address. Participants expressed concern for maintaining their image as a hard worker. They seemed hesitant to participate in SUH activities when they knew supervisors and



management would be monitoring them, and it became evident that supervisors regulated interviewer activity. This was evident especially in new contact centre staff.

*'I'm kind of new here, so I'm still at the stage where okay, I start my shift, I will not move until my supervisor says okay, you can have your break now. I feel that you're more obliged to stay. For me, even if I have to stay four hours flat, in front of the computer, I would, because oh, I can't mess this up.'* - FG 5, F8

*'One of the supervisors used to have the interviewers do some stand up stretching exercises. That was really good. I enjoyed doing that.'* FG 2, F3

Support from management was perceived as an important factor in ensuring SUH activities could be introduced and sustained successfully within the contact centre. When asked what the best ways to foster a work culture that supports sitting less and moving more would be, several participants stated a need for supportive management.

*'I think we definitely need support from management, interest from management.'* - FG 1, M2

There was also mention of incorporating SUH as part of training for new staff, so the organisation was seen as one that was taking on the programme.

*'Well, so maybe there should be a mention of that in training then, that say look guys, you don't have to be tied to your desk. Get up, stretch your legs, you'll work better when you sit back down.'* FG 5, M1

Staff stated that there was poor communication or knowledge regarding what types of activities were being offered in the contact centre which could be improved.

*'There aren't bulletins saying this is now happening or this is now not happening.'* -

*FG 4, F5*

Based on this focus group data, the activities targeting the organisational level included developing a wellness committee to organise and communicate intervention activities. The contact centre was encouraged to create a budget for health and wellness activities. Figure 3 shows the hypothesised theories of change for each level

**[Figure 3. Hypothesised theory of change]**

#### **5.5 Step 4: Developing a theory of action**

The theory of action outlines how the intervention activities will be implemented and what resources are needed to administer the activities (see Figure 4).

**[Insert Figure 4. Hypothesised theory of action]**

After defining the theories of change, the researchers identified the necessary resources available for implementation of the activities and illustrated the programme theory in a logic model to demonstrate how intervention activities would lead to intended outcomes. Inputs and resources were identified through focus groups and informal discussions with management. Focus group data revealed a need for a way to organise and administer intervention activities.

*'I'm not sure what work could do, like something across the board that would suit everyone. With this job, because everyone's all doing different things and... I don't know. I was thinking this afternoon too about this and I just didn't know if there was actually anything that would stick in this office throughout consistently. Like the five minutes every hour, maybe for a wee while or so, but would it actually stay?'* FG 4, F4

The focus groups revealed that contact centre staff were most interested in activities that would be least intrusive to their daily work.

*'Standing would probably be easier to - standing at desks would probably be easier to implement, than walking, for example...because walking takes people away from their desks, and, yeah, stops them from working.'* FG 3, M4

*'I think the most useful thing to do, you could change position a bit. You could be stood up some of the time but still work. Obviously anything else is helpful as well, getting some activity on your breaks, getting out and stuff. But I think the biggest difference would be the actual time that you're dialling.'* FG 5, M1

Based on an identified need for a way to create ownership and implement intervention activities, the researchers helped to create a *wellness committee* within the contact centre. The wellness committee met once a month to discuss strengths and weaknesses of the programme and to come up with new ideas for programme activities. The creation of the wellness committee was viewed by the staff and the researchers as a key component to the SUH intervention, as it acts as a hub for flow of information about the activities, and ensures the

activities fit within the theory of change involve all levels of the contact centre. It was emphasised that the wellness committee be composed of members from all roles within the centre, including management and supervisors, as this ensures collaboration between staff and creates ownership over intervention activities and a healthier workplace overall. It also ensures that intervention activities will likely fit into the existing workplace, as the committee members know how scheduling works and how the office is organised. The wellness committee also ensures sustainability as it provides a platform from which ideas can be discussed and logistics of activities can be arranged after the researchers have left the contact centre.

## **5.6 Step 5: Test and adapt the intervention**

With the desired equipment and activities identified, the programme was implemented over a six-month period. An action plan was developed for activities (see example in Figure 5.).

### **[Insert Figure 5. Example of an action plan]**

The researchers maintained regular contact with the wellness committee and other contact centre staff to receive informal feedback about how the activities were fitting into the workplace. Five informal interviews were conducted and used to adapt the intervention to better suit the workplace. Adaptations included suggestions for activities at the organisational level such as the creation of a wellness committee which would include a range of staff from various levels of the contact centre. It became clear from the informal discussions that the wellness committee would play a key part in intervention sustainability by creating a sense of ownership over the intervention from a representative group within the workplace, as opposed

to having just management be in charge. Another suggestion at the organisational level was the inclusion of SUH information in new call centre orientation. Call centre management began including information about SUH in new call centre staff orientation so that intervention activities were 'the norm' for staff members from their first day of work. An adaptation aimed at influencing the individual level and encouraging group interaction was encouraging staff members to bring their own skills to share at work, such as tai chi, knitting, colouring, or yoga. A few staff members began creating their own activities, like wellness cards and crosswords.

At the end of three months, feedback was sought from staff via questionnaires from the members of the original focus groups and qualitative interviews. The feedback was positive, and around 50% of staff took part in at least one activity, indicating that the contact centre staff had taken ownership of the intervention and the activities, with new activities being introduced which fitted in with the culture and context of the specific contact centre. The hypothesised theory or change was working as anticipated, and needed no further refinement.

No data was collected on the 50% of staff that did not participate. The barriers to participation are being evaluated in the larger NIHR study.

Step 6. Collecting sufficient evidence of effectiveness to proceed to a rigorous evaluation. The intervention is currently undergoing further testing and evaluation in 11 contact centres in the UK as part of a large National Institute for Public Health Research (NIHR) feasibility study (<https://www.fundingawards.nihr.ac.uk/award/17/149/19>).

## **6 Discussion**

The development of SUH using the 6SQuID framework was informed by review of evidence, intervention questionnaires including OSPAQ, and focus group data which all contributed to

defining and understanding sedentary behaviour in the contact centre setting. A review of evidence revealed that multi-component interventions, targeting more than one level of the socioecological framework, were most effective in addressing sedentary behaviour and demonstrated a continued need to measure the impact of policy-based measures and organisational change on the effectiveness of workplace-based interventions (Hutcheson et al., 2016). Contact centres present unique workplace settings which are associated with higher levels of sedentary behaviour in comparison to other office-based workplaces. A substantive lack of evidence surrounding interventions to reduce sedentary behaviour in contact centres highlights the importance of SUH for developing an adaptive intervention for this specific at-risk workforce population.

Contact centre staff recognise the sedentary nature of their work, which is often dictated by workplace culture and policies. Findings from the OSPAQ data indicated that on average employees in the contact centre spend more than five hours of their working day in a sedentary position. However, participants reported a strong overall desire to reduce daily sedentary behaviour by almost two hours per individual in the contact centre. More recent employees exhibited higher levels of sedentary behaviour compared with colleagues who have worked there for a longer duration. Focus group data identified that newer members of staff felt less comfortable or were unsure of their work environment as well as work-related pressures and a lack of information or communication with regard to minimising sedentary behaviour.

The main causes of sedentary behaviour are driven by the nature of contact centre work, which requires call-handlers to be desk-based for the majority of their shift. Pressures to be profitable and target-based workloads also leave many members of staff feeling pressurised to remain at their desk. The contact centre fostered sedentary behaviour due lack of knowledge around the

negative impacts of sedentary behaviour (individual), workplace norms involving sitting (social/community), lack of ergonomic set-up allowing standing at desks (environmental), and lack of organisation in administering health related activities (organisational). Organisational change was therefore embedded into SUH as a key component of the intervention.

There are a number of strengths of this study in relation to advancing the field of sedentary behaviour interventions. The use of the 6SQuID approach to developing a complex public health intervention is a strength because it uses a systematic framework to define the problem and identify causal factors of the problem in that context, creating an intervention that addresses the specific needs of the target population. Other multi-component interventions in contact centres (Morris et al., 2019) have not adopted a structured intervention development framework, and consequently, intervention activities were prescriptive, rather than based around identified theories of change as with SUH. To ensure transferability and adaptability, SUH takes into account the specific context (e.g. layout of the centre, work-time flexibility, budget and resources available) and targets all levels of the centre. Additionally, it invites all employees to participate from the start of development, with the aim of creating a social norm to be able to stand more at work. By gaining insight from contact centre staff about their specific needs, this approach is more likely to lead to a sustainable and effective intervention (Renton et al., 2011).

There are two main limitations to the study. First, there is lack of generalizability. The programme theory was developed in a single contact centre, which means that there may need to be further refinement of the theory in other centres. Additionally, although contact centres share many similarities, we were not able to capture variations in shift patterns, environmental structure, and type and size of organization (e.g. public or private). To address the lack of generalizability of this study, the programme is currently being further evaluated

in 11 contact centres in the UK as part of a large National Institute for Public Health Research (NIHR) feasibility study (<https://www.fundingawards.nihr.ac.uk/award/17/149/19>).

The second limitation is lack of follow-up data due to a lack of time and resources from the research endeavour. Again, the programme is currently being evaluated with longer follow-up to address this limitation.

## **7 Concluding remarks: the lessons learned**

Contact centres are unique workplaces that foster sedentary behaviour due to several factors including the pressure to meet targets, technology that keeps staff at their desks for prolonged periods of time, and a lack of autonomy amongst call handlers. The contact centre industry makes up 4% of the workforce across the UK. Although previous research has examined interventions to reduce sedentary behaviour in workplaces, there is a knowledge gap regarding contact centres specifically. This study used the 6SQuID framework to develop and implement the Stand Up for Health intervention to reduce sedentary behaviour in contact centre setting. The framework allowed for innovative and collaborative development of a complex public health intervention. Stand Up for Health was perceived to be a feasible and acceptable intervention to reduce sedentary behaviour in contact centres due to its flexibility and development as a context-specific intervention.

The theory of change was developed using multiple interacting theories around cultural norms and individual behaviour change. Use of such theories allowed us to develop an adaptive and transferable theory of change, which can be applied on other settings.

This study highlights the importance of considering contextual, cultural and system elements while developing health promoting interventions for the workplace, and authors emphasise the use of intervention development frameworks and co-production techniques.



## Funding

This research was undertaken as part of the MRC Grant MR/K023209/1. The funding source had no involvement in the study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication.

## References

- Bandura, A. (2004). Health Promotion by Social Cognitive Means. *31*(2), 143-164.  
doi:10.1177/1090198104263660
- Biddle, S. J., Bennie, J. A., De Cocker, K., Dunstan, D., Gardiner, P. A., Healy, G. N., . . . Brown, W. (2019). Controversies in the Science of Sedentary Behaviour and Health: Insights, Perspectives and Future directions from the 2018 Queensland Sedentary Behaviour Think Tank. *International Journal of Environmental Research and Public Health*, *16*(23), 4762.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77-101. doi:10.1191/1478088706qp063oa
- Centres for Disease Control and Prevention. (2020). The Social-Ecological Model: A Framework for Prevention. Retrieved from <https://www.cdc.gov/violenceprevention/publichealthissue/social-ecologicalmodel.html>
- Chau, J. Y., Grunseit, A. C., Chey, T., Stamatakis, E., Brown, W. J., Matthews, C. E., . . . van der Ploeg, H. P. (2013). Daily Sitting Time and All-Cause Mortality: A Meta-Analysis. *PLOS ONE*, *8*(11), e80000. doi:10.1371/journal.pone.0080000
- Chau, J. Y., Van Der Ploeg, H. P., Dunn, S., Kurko, J., & Bauman, A. E. (2012). Validity of the occupational sitting and physical activity questionnaire. *Medicine and science in sports and exercise*, *44*(1), 118-125. doi:10.1249/mss.0b013e3182251060

- Cho, C.-Y., Hwang, Y.-S., & Cherng, R.-J. (2012). Musculoskeletal Symptoms and Associated Risk Factors Among Office Workers With High Workload Computer Use. *Journal of Manipulative and Physiological Therapeutics*, 35(7), 534-540.  
doi:<https://doi.org/10.1016/j.jmpt.2012.07.004>
- Chu, A. H. Y., Ng, S. H. X., Tan, C. S., Win, A. M., Koh, D., & Müller-Riemenschneider, F. (2016). A systematic review and meta-analysis of workplace intervention strategies to reduce sedentary time in white-collar workers. *Obesity Reviews*, 17(5), 467-481.  
doi:10.1111/obr.12388
- Coenen, P., Gilson, N., Healy, G. N., Dunstan, D. W., & Straker, L. M. (2017). A qualitative review of existing national and international occupational safety and health policies relating to occupational sedentary behaviour. *Applied Ergonomics*, 60, 320-333.  
doi:<https://doi.org/10.1016/j.apergo.2016.12.010>
- Connelly, J. B. (2007). Evaluating complex public health interventions: theory, methods and scope of realist enquiry. *Journal of Evaluation in Clinical Practice*, 13(6), 935-941.  
doi:10.1111/j.1365-2753.2006.00790.x
- Craig, P., Dieppe, P., Macintyre, S., Michie, S., Nazareth, I., & Petticrew, M. (2013). Developing and evaluating complex interventions: The new Medical Research Council guidance. *International Journal of Nursing Studies*, 50(5), 587-592.  
doi:<https://doi.org/10.1016/j.ijnurstu.2012.09.010>
- Edwardson, C. L., Yates, T., Biddle, S. J. H., Davies, M. J., Dunstan, D. W., Esliger, D. W., . . . Munir, F. (2018). Effectiveness of the Stand More AT (SMArT) Work intervention: cluster randomised controlled trial. *BMJ*, 363, k3870.  
doi:10.1136/bmj.k3870
- Ekelund, U., Brown, W. J., Steene-Johannessen, J., Fagerland, M. W., Owen, N., Powell, K. E., . . . Lee, I.-M. (2019). Do the associations of sedentary behaviour with

cardiovascular disease mortality and cancer mortality differ by physical activity level?  
A systematic review and harmonised meta-analysis of data from 850 060 participants.  
53(14), 886-894. doi:10.1136/bjsports-2017-098963 %J British Journal of Sports  
Medicine

Ekelund, U., Steene-Johannessen, J., Brown, W. J., Fagerland, M. W., Owen, N., Powell, K.  
E., . . . Lee, I. M. (2016). Does physical activity attenuate, or even eliminate, the  
detrimental association of sitting time with mortality? A harmonised meta-analysis of  
data from more than 1 million men and women. *The Lancet*, 388(10051), 1302-1310.  
doi:[https://doi.org/10.1016/S0140-6736\(16\)30370-1](https://doi.org/10.1016/S0140-6736(16)30370-1)

Hartley, J. E., McAteer, J., Doi, L., & Jepson, R. (2019). CARE: The development of an  
intervention for kinship carers with teenage children. *Qualitative Social Work*, 18(6),  
926-943.

Health and Safety Executive. (2003). Work with display screen equipment: Health and  
Safety (Display Screen Equipment) Regulations 1992 as amended by the Health and  
Safety (Miscellaneous Amendment) Regulations 2002 (L26) [Online]. . Retrieved from  
<https://www.hse.gov.uk/pUbns/priced/l26.pdf>

Healy, G., Lawler, S., Thorp, A., Neuhaus, M., Robson, E., Owen, N., & Dunstan, D. (2012).  
*Reducing prolonged sitting in the workplace (An evidence review: full report)*.  
Retrieved from Melbourne, Australia:

Hoy, D., March, L., Brooks, P., Blyth, F., Woolf, A., Bain, C., . . . Buchbinder, R. (2014).  
The global burden of low back pain: estimates from the Global Burden of Disease  
2010 study. *Annals of the Rheumatic Diseases*, 73(6), 968. doi:10.1136/annrheumdis-  
2013-204428

- Hutcheson, A. K., Piazza, A. J., & Knowlden, A. P. (2016). Work Site–Based Environmental Interventions to Reduce Sedentary Behavior: A Systematic Review. *American Journal of Health Promotion, 32*(1), 32-47. doi:10.1177/0890117116674681
- Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting & task performance*: Prentice-Hall, Inc.
- Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American psychologist, 57*(9), 705.
- Maher, C., Underwood, M., & Buchbinder, R. (2017). Non-specific low back pain. *The Lancet, 389*(10070), 736-747. doi:https://doi.org/10.1016/S0140-6736(16)30970-9
- Morris, A., Murphy, R., Shepherd, S., & Graves, L. (2018). Multi-Stakeholder Perspectives of Factors That Influence Contact Centre Call Agents' Workplace Physical Activity and Sedentary Behaviour. *International journal of environmental research and public health, 15*(7), 1484. doi:10.3390/ijerph15071484
- Morris, A. S., Murphy, R. C., Shepherd, S. O., Healy, G. N., Edwardson, C. L., & Graves, L. E. F. (2019). A multi-component intervention to sit less and move more in a contact centre setting: a feasibility study. *BMC Public Health, 19*(1), 292. doi:10.1186/s12889-019-6615-6
- Munir, F., Biddle, S. J. H., Davies, M. J., Dunstan, D., Esliger, D., Gray, L. J., . . . Edwardson, C. L. (2018). Stand More AT Work (SMArT Work): using the behaviour change wheel to develop an intervention to reduce sitting time in the workplace. *BMC Public Health, 18*(1), 319. doi:10.1186/s12889-018-5187-1
- Office of National Statistics. (2017). Sick absence in the UK labour market: 2016. . Retrieved from <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/sicknessabsenceinthelabourmarket/2016>

- Owen, N., Healy, G. N., Matthews, C. E., & Dunstan, D. W. (2010). Too much sitting: the population health science of sedentary behavior. *Exercise and sport sciences reviews*, 38(3), 105-113. doi:10.1097/JES.0b013e3181e373a2
- Proper, K. I., Singh, A. S., van Mechelen, W., & Chinapaw, M. J. M. (2011). Sedentary Behaviors and Health Outcomes Among Adults: A Systematic Review of Prospective Studies. *American Journal of Preventive Medicine*, 40(2), 174-182. doi:https://doi.org/10.1016/j.amepre.2010.10.015
- Renton, S. J., Lightfoot, N. E., & Maar, M. A. (2011). Physical activity promotion in call centres: employers' perspectives. *Health Education Research*, 26(6), 1050-1059. doi:10.1093/her/cyr055
- Rezende, L. F. M. d., Rodrigues Lopes, M., Rey-López, J. P., Matsudo, V. K. R., & Luiz, O. d. C. (2014). Sedentary Behavior and Health Outcomes: An Overview of Systematic Reviews. *PLOS ONE*, 9(8), e105620. doi:10.1371/journal.pone.0105620
- Santos, R., Mota, J., Okely, A. D., Pratt, M., Moreira, C., Coelho-e-Silva, M. J., . . . Sardinha, L. B. (2014). The independent associations of sedentary behaviour and physical activity on cardiorespiratory fitness. *British Journal of Sports Medicine*, 48(20), 1508. doi:10.1136/bjsports-2012-091610
- Shrestha, N., Kukkonen-Harjula, K. T., Verbeek, J. H., Ijaz, S., Hermans, V., & Pedisic, Z. (2018). Workplace interventions for reducing sitting at work. *Cochrane Database of Systematic Reviews*(6). doi:10.1002/14651858.CD010912.pub4
- Sinclair, J. M., Dutey-Magni, P. F., Anderson, A. S., Baird, J., Barker, M. E., Cutress, R. I., . . . Copson, E. R. (2020). A Context-Specific Digital Alcohol Brief Intervention in Symptomatic Breast Clinics (Abreast of Health): Development and Usability Study. *JMIR Research Protocols*, 9(1), e14580.

- Smith, L., McCourt, O., Sawyer, A., Ucci, M., Marmot, A., Wardle, J., & Fisher, A. (2016). A review of occupational physical activity and sedentary behaviour correlates. *Occupational Medicine*, 66(3), 185-192. doi:10.1093/occmed/kqv164
- Sprigg, C. A., Smith, P. R., & Jackson, P. R. (2003). Psychological risk factors in call centres: An evaluation of work design and well-being. Retrieved from <https://www.hse.gov.uk/research/rrpdf/rr169.pdf>
- Straker, L., Abbott, R. A., Heiden, M., Mathiassen, S. E., & Toomingas, A. (2013). Sit–stand desks in call centres: Associations of use and ergonomics awareness with sedentary behavior. *Applied Ergonomics*, 44(4), 517-522. doi:<https://doi.org/10.1016/j.apergo.2012.11.001>
- Straker, L., Coenen, P., & Dunstan, D. (2016). Sedentary Work – Evidence on an Emergent Work Health and Safety Issue – Final Report, Canberra: Safe Work. In.
- Thorp, A. A., Healy, G. N., Winkler, E., Clark, B. K., Gardiner, P. A., Owen, N., & Dunstan, D. W. (2012). Prolonged sedentary time and physical activity in workplace and non-work contexts: a cross-sectional study of office, customer service and call centre employees. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 128. doi:10.1186/1479-5868-9-128
- Thorp, A. A., Owen, N., Neuhaus, M., & Dunstan, D. W. (2011). Sedentary Behaviors and Subsequent Health Outcomes in Adults: A Systematic Review of Longitudinal Studies, 1996–2011. *American Journal of Preventive Medicine*, 41(2), 207-215. doi:<https://doi.org/10.1016/j.amepre.2011.05.004>
- Tremblay, M. S., Aubert, S., Barnes, J. D., Saunders, T. J., Carson, V., Latimer-Cheung, A. E., . . . on behalf of, S. T. C. P. P. (2017). Sedentary Behavior Research Network (SBRN) – Terminology Consensus Project process and outcome. *International*

*Journal of Behavioral Nutrition and Physical Activity*, 14(1), 75. doi:10.1186/s12966-017-0525-8

van Rooyen, H., Essack, Z., Rochat, T., Wight, D., Knight, L., Bland, R., & Celum, C.

(2016). Taking HIV Testing to Families: Designing a Family-Based Intervention to Facilitate HIV Testing, Disclosure, and Intergenerational Communication. *Frontiers in Public Health*, 4(154). doi:10.3389/fpubh.2016.00154

Vos, T., Barber, R. M., Bell, B., Bertozzi-Villa, A., Biryukov, S., Bolliger, I., . . . Murray, C.

J. L. (2015). Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*, 386(9995), 743-800. doi:https://doi.org/10.1016/S0140-6736(15)60692-4

Wight, D., Wimbush, E., Jepson, R., & Doi, L. (2016). Six steps in quality intervention

development (6SQuID). *Journal of epidemiology and community health*, 70(5), 520-525. doi:10.1136/jech-2015-205952

Wilmot, E. G., Edwardson, C. L., Achana, F. A., Davies, M. J., Gorely, T., Gray, L. J., . . .

Biddle, S. J. H. (2012). Sedentary time in adults and the association with diabetes, cardiovascular disease and death: systematic review and meta-analysis. *Diabetologia*, 55(11), 2895-2905. doi:10.1007/s00125-012-2677-z

Zhai, L., Zhang, Y., & Zhang, D. (2015). Sedentary behaviour and the risk of depression: a

meta-analysis. *British Journal of Sports Medicine*, 49(11), 705. doi:10.1136/bjsports-2014-093613

## **APPENDIX**

### **Appendix 1. Topic Guide**

Introduction: As you know, we'll be sharing our opinions on workplace sitting time and physical activity. We would like to find out more about your working day, how it affects your health, and how it could be improved.

#### **The working day**

Can you describe a regular workday to us?

Prompts: What time do you get to work and how do you get there? How long are shifts? How many breaks? How much time do you spend sitting or standing? What opportunities are there for moving around or standing up? When do you think you are most productive/alert/feeling good and why?

#### **Working and your health**

1. Do you think your work impacts on your health? [Prompt for what ways, positive and negative]
2. What do you think are the symptoms of sitting for too long? [prompt for whether they have any of these, or know of others that do]
3. Do you think your work impacts on the activities you do outside the workplace? [prompts about shift work, travelling etc]
4. What does workplace health mean to you? [Prompt Eating, taking breaks, feeling safe?]
5. How important is a healthy workplace to you and why?
6. What are the biggest health issues for you at the moment? [Prompts could include weight, stress, wellbeing, concentration, mood]

#### **The workplace and your workspace**

1. If you could change anything about the office or your workday what would you change?
2. Do you interact with other employees often, and if yes, how do you interact?
3. How would you describe the general work culture?[Prompts - do people take breaks when needed/wanted? Relaxed or strict?]
4. How do you feel about the office set up and your workspace?
5. How do you feel about sitting at your desk?

#### **Interventions to improve health in the workplace**

1. What sort of healthy workplace activities are there in your contact centre?
2. What effect do you think sitting has on you (prompt health, work)



3. Why do you think this is?
4. What activities (here or elsewhere) have been most beneficial to you and why?
5. Which activities have you found to be least effective and why?
6. What do you think would encourage you to stand more during the workday?
7. Is there anything you would like to change about the office setup?
8. How do you think that being more active (sitting less, moving more) in the workplace could become something that is normal and part of the office culture? [prompts – buddies, challenges, competitions, champions, rewards, posters, education, reminder

## TABLES

**Table 1: Overview of framework and methods**

<b>Six Steps in Quality Intervention Development</b>	<b>Data Sources and Methods</b>
1. Defining the problem	Review of evidence <hr/> A questionnaire including the items from the Modified Occupational Sitting and Physical Activity Questionnaire (OSPAQ) <hr/> Focus groups with contact centre staff
2. Identifying modifiable and non-modifiable causal factors	Review of above data
3. Defining the theory of change	Development of a logic model for the theory of change <hr/> Workshop with contact centre staff
4. Defining the theory of action	Development of a logic model for a theory of action <hr/> Discussions with contact centre management about resources available <hr/> Developing a priority list of activities to be implemented <hr/> Development of an action plan
5. Testing and refining the intervention	Piloting of intervention activities <hr/> Discussions with contact centre staff
6. <i>Collecting evidence of effectiveness to justify evaluation and implementation</i>	<i>This study reports 6SQuID steps 1-5. Step 6 is currently being taken forward as part of a larger piece of work</i> <a href="http://www.isrctn.com/ISRCTN11580369">http://www.isrctn.com/ISRCTN11580369</a>

**Table 2. Summary of focus group participants**

Gender	Age	Employment Length	Position
16 F	2 (21 - 25)	7 (<1 year)	25 (casual)
15 M	3 (26 - 30)	8 (1 - 3 years)	3 (permanent)
	5 (31 - 35)	5 (3 - 5 years)	3 (manager)
	5 (36 - 40)	5 (5 - 10 years)	
	6 (41 - 45)	6 (> 10 years)	
	5 (46 - 50)		
	3 (51 - 55)		
	1 (56 - 60)		
	1 (61 - 65)		

**Table 3. Summary of baseline OSPAQ results**

**Table 3. Summary of baseline OSPAQ results**

Employment duration (years)	Number of employees	Hours worked in last 7 days	Days worked in last 7 days	Actual daily sitting (%)	Desired daily sitting (%)
<1	7	18	3	80	58
1-3	8	35	5	79	51
3-5	5	39	5	76	53
5-10	5	45	5	70	49
>10	6	33	5	64	31
Average		33.92	4.34	73.90	48.39

## **Figure captions**

### **Figure 1: Timeline of intervention implementation and evaluation**

Intervention activities were implemented and monitored over a 6-month period. This timeline provides a visual for intervention implementation.

Note – to be printed in colour

### **Figure 2: Fishbone diagram of modifiable and non-modifiable factors**

Modifiable and non-modifiable factors leading to sedentary behaviour in the contact centre were identified and presented in a fishbone diagram

Note- to be printed in colour

### **Figure 3. Hypothesised theory of change**

This is the hypothesised theories of change at Individual, social, organisational and environmental levels

Note- to be printed in colour

### **Figure 4. Hypothesised theory of action**

The theory of action outlines how the intervention activities will be implemented

Note- to be printed in colour

### **Figure 5. Example of an action plan**

This is an example action plan that provides details (initiative, tasks, who will be responsible, costs, etc) for each intervention activity

Note- to be printed in colour

## **Table captions**

### **Table 1: Overview of framework and methods**

Table 1 provides details of the methods and data sources used for each step of intervention development

**Table 2: Summary of focus group participants**

Table 2 provides a summary of the call centre staff who took part in the focus groups.

**Table 3: Summary of baseline OSPAQ results**

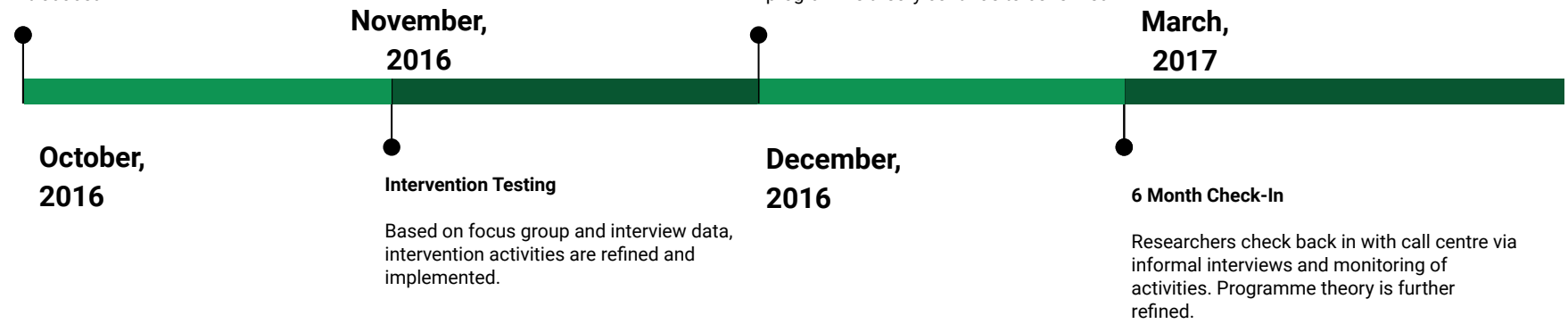
Table 3 provides a summary of results from the questionnaire (OSPAQ) administered to 31 employees.

**Baseline OSPAQ**

Focus group and interview participants are recruited, and baseline OSPAQ is administered. Intervention activities are introduced

**3 Month OSPAQ**

Researchers administer a follow-up questionnaire at 3 months of intervention activities. Intervention activities and programme theory continue to be refined.



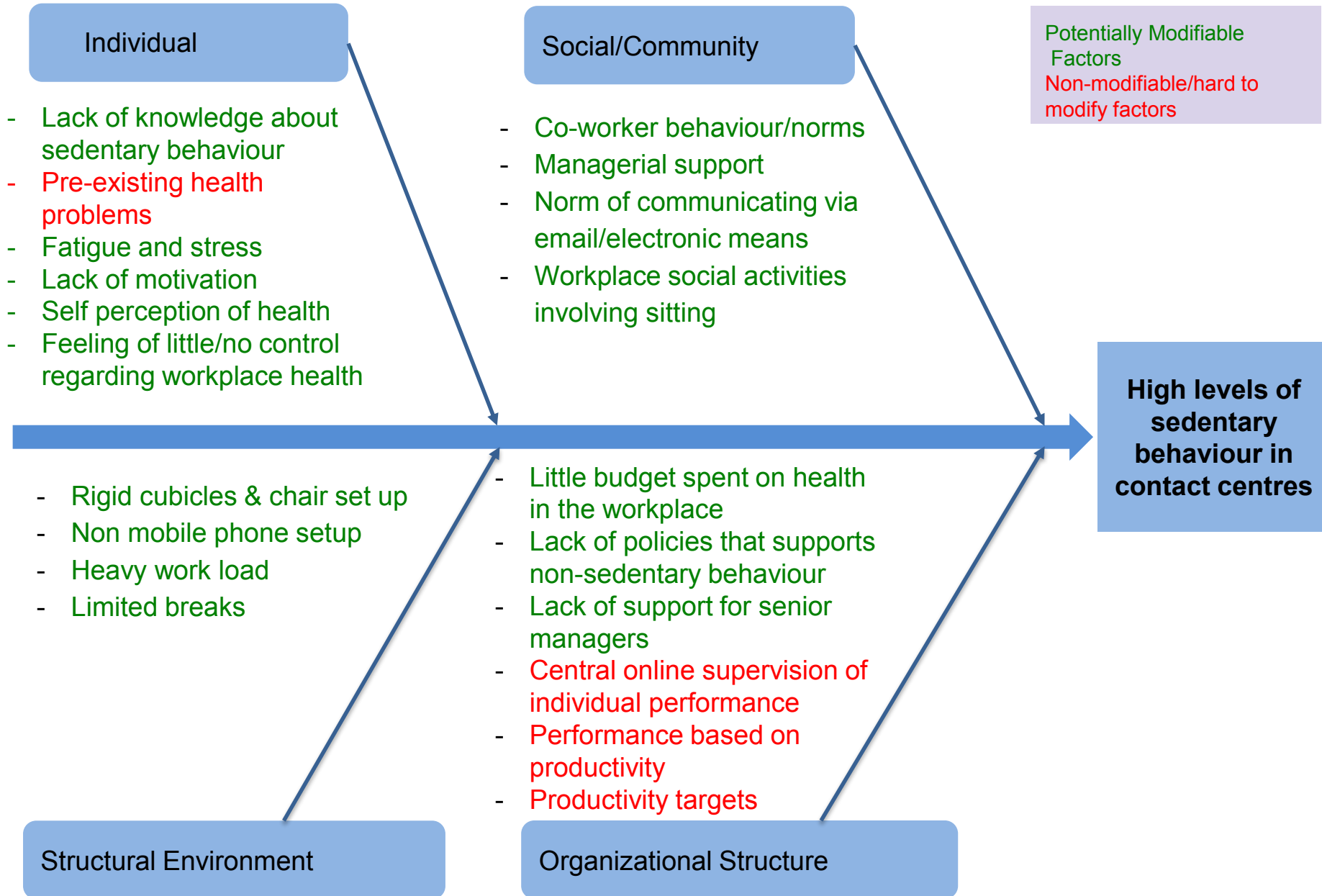


Figure 3

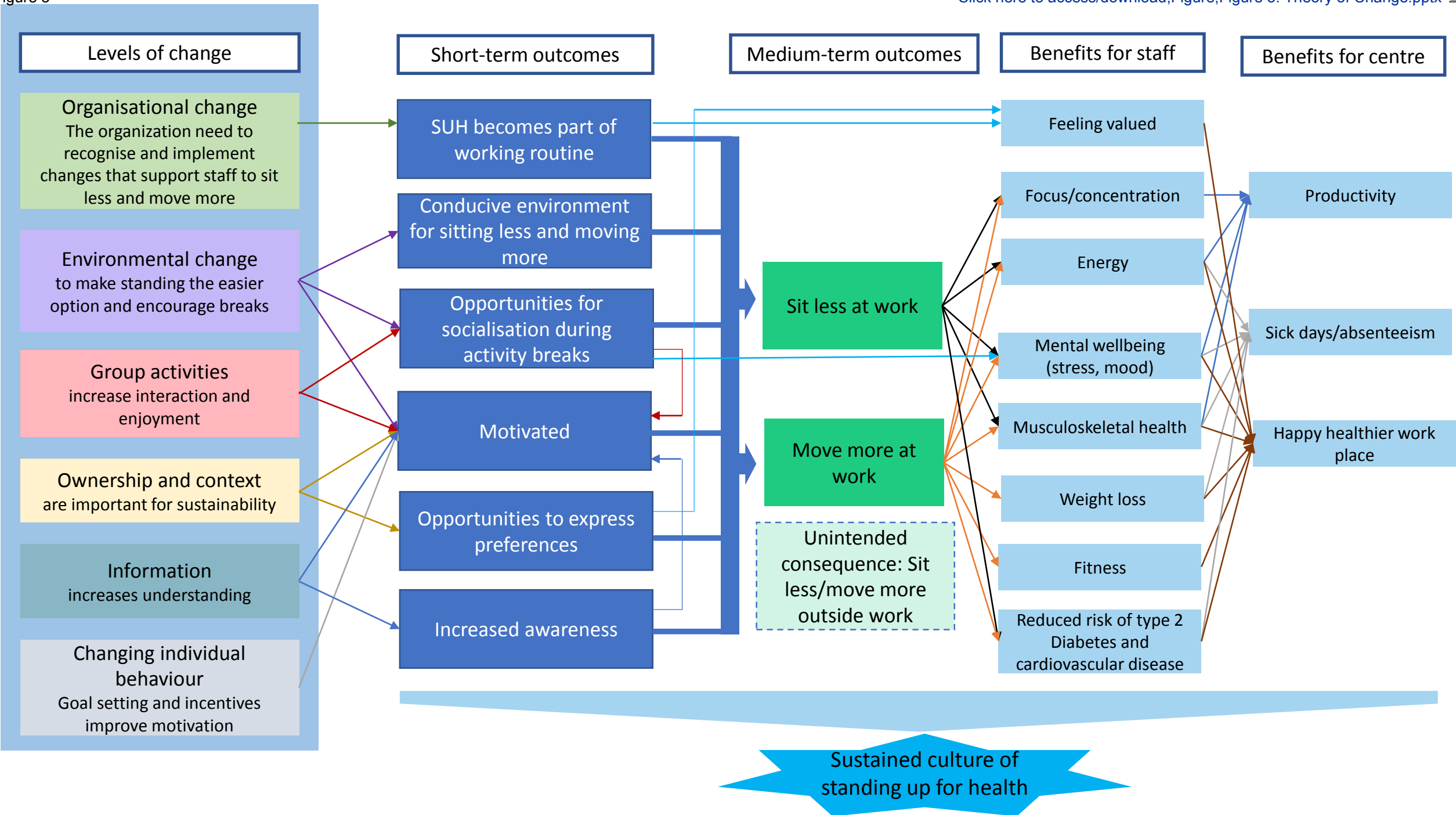
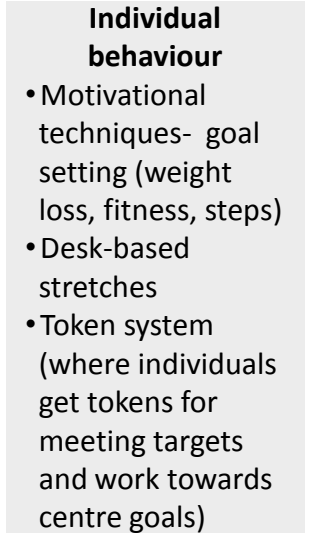
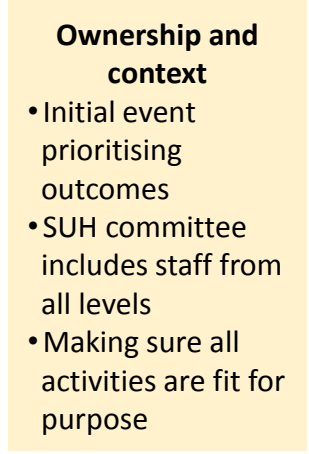
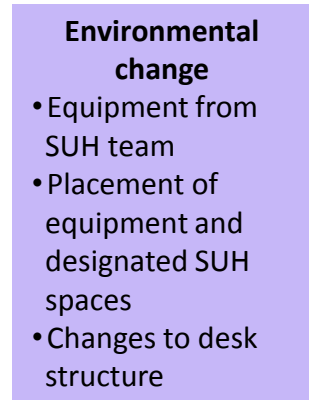
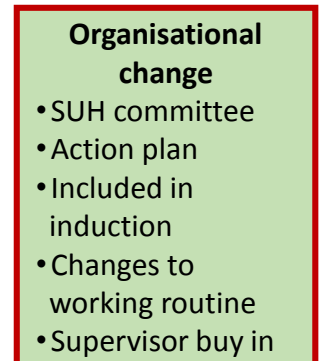
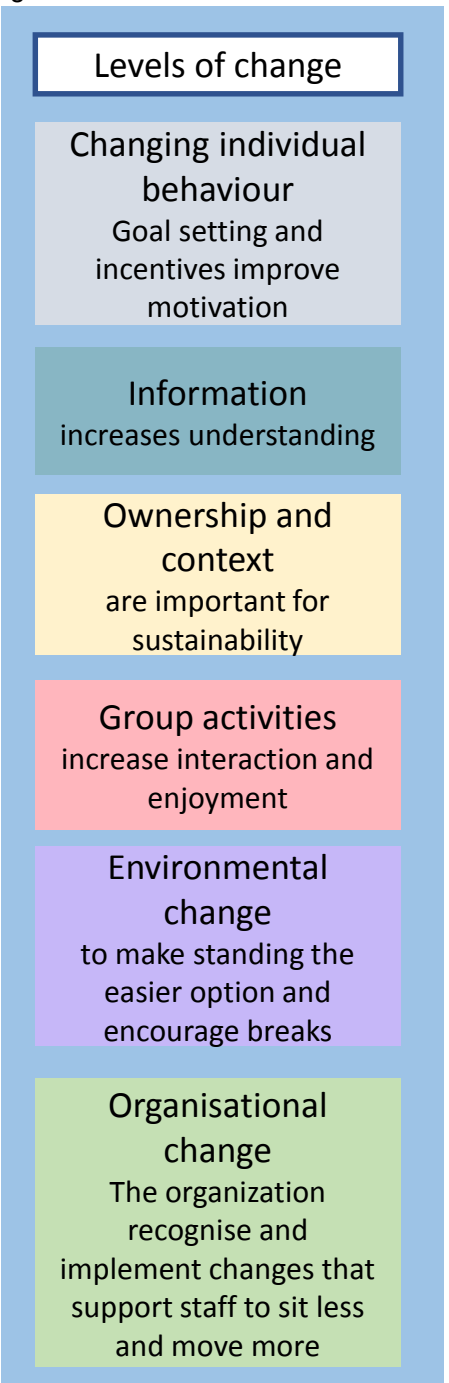
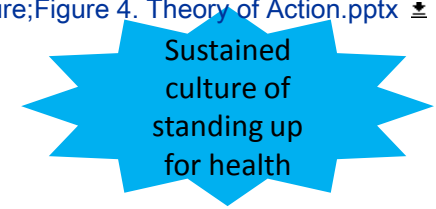




Figure 4



Level	Initiative	Tasks	Who will be responsible?	Who will be involved? (internal and external)	Facilities	Cost implications	Timeline
Organisational	15-minute SUH activity break once per week, approved by upper management	Put 15 min breaks in staff calendars	Supervisors responsible for delivery	All staff will have the opportunity to take part	NA	None	Trial for 3 months
Environmental	SUH equipment on call floor	Place equipment on call floor and in shared spaces within the centre, rotating monthly	SUH Committee members	All staff	Various work and leisure spaces around centre	None – equipment provided by SUH project team	Equipment to be placed in 3 areas for 1 month each
Group activities	Desk stretches	Daily desk stretches on the call floor	Staff responsible for delivery	All staff on the call floor who are available	NA	NA	Daily - trial for 3 months
Ownership and context	Collect staff preferences and feedback at SUH events held in centre	SUH project team to run 2 SUH project events in the centre	SUH project team, SUH Committee members	All staff	Conference room	None	2 events, 3 months apart
Information	Posters highlighting the benefits of standing more	Posters around centre with statistics on health conditions/concerns, easy stretches and exercises	SUH project team, SUH Committee members	All staff	Various work and leisure spaces around centre	None	Posters up for 3 months, to be rotated out by other SUH related posters
Individual behaviour	Remembering to stand up and move at regular intervals	SUH events run by SUH project staff, reminders in emails, posters, reminders for activity breaks on phones and computers	SUH project team, SUH Committee members, staff themselves	All staff	None	None	Ongoing

## Author biography

**Laura Tirman:** Laura holds a BSc in Biological Sciences from the University of California Santa Barbara and a Master of Public Health from the University of Edinburgh. Laura joined SCPHRP, University of Edinburgh in October of 2016 to develop and test the Stand Up for Health programme.

**Hannah Biggs:** Hannah holds a Sociology MA (Hons) from the University of Edinburgh. She joined SCPHRP, University of Edinburgh in 2019, and has over 10 years of public health research, development, facilitation and support experience with expertise in mental health. She is currently a Senior Researcher at ScotCen Social Research, Edinburgh.

**Kathleen Morrison:** Kathleen holds an honours degree in Neuroscience from the University of Dundee and a Master of Public Health from the University of Edinburgh.

Kathleen joined SCPHRP, University of Edinburgh in 2017 and has since worked on projects focussed around intervention development and evaluation. In January 2019, Kathleen began studying for a PhD at the University of Edinburgh under the supervision Professor Ruth Jepson and Dr Larry Doi.

**Jillian Manner:** Jillian has a BSc in Kinesiology and Health Science (York University, Canada) and a Masters in Public Health (University of Waterloo, Canada). Jillian joined SCPHRP, University of Edinburgh, in 2017 and has been involved in several different projects including an NIHR funded grant to evaluate 20mph speed limits in Edinburgh and Belfast. She is currently working on an NIHR funded evaluation of the Stand Up for Health programme.

**Dr. Divya Sivaramakrishnan:** Divya is a Postdoctoral Researcher with the Scottish Collaboration for Public Health Research and Policy, and is currently working on an NIHR funded evaluation of the Stand Up for Health programme. Divya has a BA in Economics (Stella Marris College, India), MSc in Economics (Madras School of Economics, India), and a MSc in Sport and Health Sciences (University of Exeter, UK). She did her PhD with the Physical Activity for Health Centre, University of Edinburgh.

Dr. Graham Baker: Graham is a Lecturer in Physical Activity for Health, based within the Physical Activity for Health Research Centre (PAHRC), University of Edinburgh. He is currently a co-investigator on an NIHR funded grant to evaluate 20mph speed limits in Edinburgh and Belfast, as well as the Stand Up for Health project. Graham was Principal Investigator on an MRC PHIND funded project which looked at developing a culturally adapted walking intervention in South Asian adults in Scotland.

Professor Ruth Jepson: Professor Ruth Jepson is the Director, Scottish Collaboration for Public Health Research and Policy (SCPHRP) and Director of Research, School of Health in Social Science, University of Edinburgh. Ruth has been involved in many different aspects of public health research for over 20 years. She is currently Principal Investigator on an NIHR funded grant to evaluate 20mph speed limits in Edinburgh and Belfast, as well as the Stand Up for Health project.

### **Conflict of Interest**

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.