In Practice

A remote behaviour change service for increasing physical activity in people with chronic lung conditions: intervention development using the Behaviour Change Wheel

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BACKGROUND

Physical inactivity is rising in the UK adult population, particularly in those with a long-term health condition.[1] People living with chronic lung conditions (e.g. chronic obstructive pulmonary disease, bronchiectasis, pulmonary fibrosis) have lower daily physical activity levels compared to aged-matched healthy populations.[2,3]

Structured physical activity programmes, such as pulmonary rehabilitation, a face-to-face 6- to 8-week intervention, are one of the key treatments for chronic lung conditions.[4] However, across the UK, there are barriers preventing people with a lung condition from attending these programmes including accessibility, under-referral and long waiting times.[5] Current evidence also suggests that completing short-term structured programmes does not always translate to long-term behaviour change (i.e. daily physical activity).[6]

Remote-based interventions, including web and telephone, can support change in physical activity behaviour.[7] These interventions, however, are not readily

available for people with a lung condition in the UK. Third-sector organisations such as the British Lung Foundation can support the availability of remote-based interventions targeting physical inactivity in people with lung conditions.

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SERVICE DEVELOPMENT

The importance for having a theoretical basis for intervention development is well established.[8] The Behaviour Change Wheel (BCW) is a theoretically driven framework designed to enable the systematic development of interventions for supporting behaviour change.[9] At the centre of the framework is the COM-B model, which sets out the need for a change in an individual's capability, opportunity or motivation for behaviour change to occur. We report the development of a new British Lung Foundation service for physical activity, to be delivered remotely, according to the key stages of the BCW.

Stage 1 (Understanding the behaviour)

The first step in using the BCW requires defining and specifying the target behaviour. National surveys of physical activity in the UK define inactive populations as those completing fewer than 30 minutes of moderate-intensity equivalent physical activity per week.[1] The biggest gain to be made in public health and the best value for public investment is in supporting the people who are least active.[1] As such, increasing the proportion of people with lung conditions who complete more than 30 minutes of physical activity per week was chosen as the focus of this service.

Having specified the target behaviour, the next step was to identify what needed to change ('behavioural diagnosis') to achieve the desired behaviour change. This required a full understanding of the barriers and facilitators to physical activity in people with lung conditions.

We performed a review of the literature (using PubMed) to support a behavioural diagnosis. The search strategy was structured around free text terms for the population (e.g. 'COPD') and behaviour (e.g. 'physical activity'). The search retrieved 250 articles, of which 5 were identified as relevant to intervention development. We held a workshop with health and social care professionals ($n=3$) and people with lung conditions ($n=3$) to further explore the beliefs of key stakeholders. The barriers and facilitators to physical activity were finalised and mapped to the COM-B model (Table 1).

Stage 2 (Identifying intervention options)

The next step of the BCW considers nine potential intervention functions that can bring about change in an individual's capability, opportunity and motivation, and seven policy categories that support

Table 1.

Outline of the final design of the intervention, guided by the Behaviour Change Wheel

COM-B component	Barrier	Facilitator	Related BCW Intervention Function	Intervention components			Behaviour Change Techniques including BCTTv1 code[a]
				Phone support	Information pack (sent to all participants at baseline)	Email newsletters (sent to all participants at month 1, 2, 3, 6, 9, 12)	
Psychological capability	Lack of knowledge of the importance of physical activity, including knowledge of family members	Knowledge of the importance of being active	Education	Provide information about the health benefits of physical activity and how it may alleviate symptoms of their condition Encourage participants to speak to their family/peers about the importance of being active with their condition Promote use of BLF's existing patient forum (Health Unlocked) to share experiences	Written health information about health consequences and social/environmental benefits – references to encourage participants to share this information with their friends and family Includes exercise video which has educational information from a clinician and a patient	Month 1 themed around the benefits of being active	5.1 Information about health consequences 5.3 Information about social and environmental consequences 6.3 Information about others' approval 9.1 Credible source 12.5 Adding objects to the environment
			Enablement	Help participants to find activities that they enjoy Support participants to set short-, medium- and long-term goals for physical activity and outcomes important to them. Identify rewards and positive achievements Encourage participants to make plans to be physically active at a particular time on certain days of the week Support participants to identify specific personal triggers for physical inactivity and develop strategies to address these Review the patient's goals with the patient and how behaviour corresponds to agreed goals. Consider modifying goal accordingly	Includes guidance on getting started Includes guidance for goal setting Includes task on tracking progress which includes goal setting Includes activity diary for goal setting, action planning, self-monitoring, self-reward and goal review. Also prompts assessment of feelings after being active. Includes problem-solving task for overcoming barriers Includes task to consider advantages and disadvantages of becoming active	Month 1 and 2 include references and tips on how to get started Month 6 themed around goal setting and tracking progress	1.1 Goal setting (behaviour) 1.2 Problem solving 1.3 Goal setting (outcome) 1.4 Action planning 1.5 Review behaviour goal(s) 1.7 Review outcome goal(s) 2.3 Self-monitoring of behaviour 5.4 Monitoring of emotional consequences 8.3 Habit formation 9.2 Pros and cons 10.9 Self reward

(continued)

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Outline of the final design of the intervention, guided by the Behaviour Change Wheel

COM-B component	Barrier	Facilitator	Related BCW Intervention Function	Intervention components			Behaviour Change Techniques including BCTTv1 code[a]
				Phone support	Information pack (sent to all participants at baseline)	Email newsletters (sent to all participants at month 1, 2, 3, 6, 9, 12)	
Physical opportunity		Access to resources, equipment and opportunities	Enablement	Use motivational interviewing to help individual to decide what activities might be best for participants to try Help participants to find activities in their local community or ways to be active at home Give practical information on local physical activity opportunities and transport links. This may include access to specialist services for individuals who require professional support Suggest mobile applications or activity websites	Includes suggestions for resources, national physical activity opportunities, activities of daily living, pulmonary rehabilitation and other activities Includes task about identifying different activities to try and space to record information Includes task to reduce sedentary time Includes exercise video which provides resource to do exercise at home Provide pedometers to those interested in walking or step-based goals (optional)	Month 9 themed around different ways to be active	1.1 Goal setting (behaviour) 2.2 Feedback on behaviour 3.1 Social support (unspecified) 8.1 Behavioural practice/ rehearsal 8.2 Behaviour substitution 12.5 Adding objects to the environment
Social opportunity	No one to be active with Lack of encouragement		Enablement	Provide encouragement and social support Encourage participants to be active with friends and family Welcome family members on calls if requested Create personalised plans to be active which include family and friends Encourage participants who are motivated by the social side of physical activity to find groups to be active with Promote use of BLF's existing patient forum (Health Unlocked) as a source of social support and sharing experiences	Includes resources to support participants to be active, for example, activity diary and A3 activity wallchart and prompts to be active with others	All include references to being active with family and friends	1.4 Action planning 3.1 Social support (unspecified) 7.1 Prompts and cues

(continued)

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Outline of the final design of the intervention, guided by the Behaviour Change Wheel

COM-B component	Barrier	Facilitator	Related BCW Intervention Function	Intervention components			Behaviour Change Techniques including BCTTv1 code[a]
				Phone support	**Information pack (sent to all participants at baseline)**	**Email newsletters (sent to all participants at month 1, 2, 3, 6, 9, 12)**	
			Modelling	Promote use of BLF's existing patient forum (Health Unlocked) as a source of sharing positive achievements	Includes exercise video which shows people with lung conditions being active and a case study from an individual with a lung condition	Month 3 includes case studies to reinforce facilitators and reduce barriers	4.1 Instruction on how to perform a behaviour 6.1 Demonstration of behaviour 12.5 Adding objects to the environment
			Environmental restructuring	Support the individual to restructure their social environment to encourage physical activity and to identify environmental/social stimuli to be active and use these to encourage physical activity	Includes exercise to identify difficult situations, sources of social support and social cues that will facilitate physical activity	Includes top tips to encourage environmental restructuring, for example, placing trainers by the front door	7.1 Prompts/cues 12.1 Restructuring the physical environment 12.2 Restructuring the social environment
Reflective motivation	Psychological distress of living with a lung condition including fear, embarrassment frustration and disappointment Perception of low importance of physical activity		Education	Increase knowledge of what activities will suit participants and what they may enjoy while encouraging them to commence at a level that is right for them and gradually increase over time Reframe negative cognitions related to being active and create more positive beliefs about physical activity Provide participants with information/evaluative feedback based on their self-monitoring (also *Persuasion*)	Includes health information on the importance of physical activity Includes a task on how might life be different by becoming active and identifying advantages and disadvantages of change Provide pedometer to those interested in step-based goals (optional) and encourage use alongside monitoring in activity chart/diary	Month 1 themed around the benefits of being active Month 2 themed around managing breathlessness and associated emotions	2.2 Feedback on behaviour 5.1 Information about health consequences 5.3 Information about social and environmental consequences 9.2 Pros and cons 9.3 Comparative imagining of future outcomes 12.5 Adding objects to the environment

(continued)

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Outline of the final design of the intervention, guided by the Behaviour Change Wheel

COM-B component	Barrier	Facilitator	Related BCW Intervention Function	Intervention components			Behaviour Change Techniques including BCTTv1 code[a]
				Phone support	**Information pack (sent to all participants at baseline)**	**Email newsletters (sent to all participants at month 1, 2, 3, 6, 9, 12)**	
			Persuasion	Provide encouragement Increase self-efficacy to be active through motivational interviewing Help participants to develop a positive perception of being active. Reframe negative past experiences Inform the patient of how their patient-reported outcome measures have changed since baseline at follow-up intervals (also *Education*)	Includes health information on the importance of physical activity	Case studies included in each newsletter to aim to change perceptions of being active with a lung condition	3.1 Social support (unspecified) 2.7 Feedback on outcome of behaviour 5.1 Information about health consequences 5.3 Information about social and environmental consequences 13.2 Framing/reframing
Automatic motivation		Physical activity becoming a habit	*The intervention has been designed to facilitate physical activity becoming a habit, and thus automatic motivation is incorporated throughout the intervention as an outcome of the intervention functions described above*				
			Training	Support participants to establish a daily routine and to make plans to be active at particular time on defined days of the week, so that these form habits over time Encourage the patient to record their weekly physical activity	A3 activity wallchart and activity diary to record activity and encourage habit creation Provide pedometers (or signpost to step counting apps to use on their phone) to those who are interested in step-based goals (optional) Includes exercise videos	Month 12 themed around habit creation	2.3 Self-monitoring of behaviour 8.1 Behavioural practice/rehearsal 8.3 Habit formation 12.5 Adding objects to the environment

BCW: Behaviour Change Wheel; BCTTv1: Behaviour Change Technique Taxonomy Version 1; BLF: British Lung Foundation.
Behaviour Change Techniques, delivered by a remote service, have been identified as ways to address the intervention functions that are linked to barriers and facilitators of physical activity in people with lung conditions.
[a]Behaviour Change Techniques '9.1 Credible source' applies throughout the intervention as the intervention is delivered by the British Lung Foundation.

the delivery of the intervention functions. An additional review of the literature was conducted to identify the available evidence on remote interventions. PubMed was searched for population terms (as in Stage 1) alongside free text terms for remote interventions (e.g. 'digital', 'text', 'phone', 'web', 'app'). The search returned 1566 results, of which 14 were deemed relevant for further review.

The articles were reviewed for intervention functions, policy categories and behaviour change techniques (BCT) according to the Behaviour Change Technique Taxonomy (BCTTv1).[10] We again consulted our stakeholder group to provide their perspectives. Decision making on intervention functions and policies was an iterative process and informed by the APEASE (affordability, practicability, effectiveness, acceptability, side effects and safety, equity) criteria. The intervention functions of 'incentivisation', 'restriction' and 'coercion' were excluded for not meeting the APEASE criteria. The majority of studies with positive outcomes for physical activity in the existing literature utilised the intervention functions of 'enablement' and 'education'. The functions of 'training', 'environmental restructuring', 'modelling' and 'persuasion' were also deemed to be appropriate for addressing what needs to change (Table 1). In terms of delivery of these intervention functions, many policy categories were not deemed practicable or acceptable, including fiscal measures, regulation, legislation and environmental/social planning. Intervention functions delivered through service provision, supported by communications/marketing and use of existing physical activity guidelines were deemed most appropriate.

Stage 3 (Identifying intervention content and implementation)

The final steps were to consider the relevant BCT and delivery mode of the intervention functions. The most frequently used BCT linked to these intervention functions in the extant literature were 'goal setting (behaviour)', 'self-monitoring of behaviour', 'social support (unspecified)', 'information about social and environmental consequences' and 'adding objects to the environment'. Further review of the BCTTv1[10] and stakeholder discussions identified another 23 BCT that met the APEASE criteria (Table 1). A 12-month telephone (health coaching) intervention for each individual, supported by printed (information pack including an activity diary and wallchart) and digital resources (email newsletters, exercise videos and an optional pedometer), were agreed to be modes of delivery that met the APEASE criteria for people with lung conditions. The implementation of each BCT and the final design of the intervention content are provided in Table 1.

POTENTIAL IMPACT AND IMPLICATIONS

The BCW enabled the systematic development of a telephone service for inactive people with lung conditions. The importance of physical activity in management of lung conditions is well recognised. Increased physical activity is associated with improved symptoms and quality of life, and reduced health care use in people with lung conditions. An assessment of the feasibility and potential impact of this new British Lung Foundation service is currently being undertaken in England, with the evaluation framework due to be reported in a subsequent paper. The findings of this evaluation will inform the potential scalability and transferability of this intervention for achieving wider public health impact.

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CONFLICT OF INTEREST

J.P. was employed by the British Lung Foundation, which funded this work. The remaining authors declare no other conflicts of interest.

ETHICAL APPROVAL

Defined as usual practice by the Health Research Authority and therefore no research ethics committee approval sought.

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