An evidence-based redevelopment of a tool to support behaviour change in community settings using the Behaviour Change Wheel

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Reference

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Cancer Research UK

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Abstract

Background

Research shows that leading a healthy lifestyle can help prevent cancer. Further, diagnosing cancer at an early stage can increase survival rates. Cancer Research UK (CRUK)'s nurse-led outreach activity supports cancer prevention, early diagnosis and screening in deprived community settings. CRUK developed a habit-based behaviour change tool to support this activity and better enable conversations about behaviour change.

Purpose

We conducted a process evaluation of the current tool and a behavioural diagnosis of behaviour change attempts in outreach activity visitors. Results informed redevelopment of the tool.

Methods

A focus group with nurses (n=5) explored use and acceptability of the current tool. Observation of outreach activity (n=1) identified barriers and facilitators to behaviour change attempts and were mapped onto the Behaviour Change Wheel. The results informed redevelopment of the tool and feedback from key stakeholders led to further refinements.

Results

The focus group revealed that the current tool was not relevant for some conversation topics. The observation revealed two types of visitor: those with high and low motivation to make health behaviour changes. Two new tools were developed, one to support those with low motivation and one to support those with high motivation to turn their motivation into action. The new tools utilised 14 behaviour change techniques and aimed to support a wider range of health behaviour conversations.

Conclusions

This study adopted a theory and evidence-based approach to develop two behaviour change tools which equip nurses leading community outreach activity to support health behaviour change in members of deprived communities.

Contents

Introduction

Noncommunicable diseases (including cancer, diabetes, cardiovascular disease and chronic respiratory disease) accounted for 71% of worldwide deaths in 2016 (World Health Organisation 2018). Modifiable factors significantly contribute to a person's risk of non-communicable diseases. For cancer specifically, around 4 in 10 cancers could be prevented by modifiable factors, including lifestyle factors like quitting smoking, keeping a healthy weight, reducing sun exposure, drinking less alcohol, and eating a healthy balanced diet (Brown et al. 2018). Cancer can also be prevented by screening programs. Specifically, cervical screening detects and treats abnormal cells before they turn into cancer (Landy et al. 2016).

Further, deaths from cancer can be reduced by early diagnosis. If cancer is diagnosed at an early stage, treatment is more likely to be successful and survival rates are better (Ciccolallo et al. 2005; Maringe et al. 2012; Sant et al. 2003; Walters et al. 2013). One route to early diagnosis of cancer is for an individual to go to their doctor if they notice an unusual or persistent change in their body. GP referrals account for approximately 23% of cancer diagnoses each year (Public Health England 2020). Additionally, UK screening programmes have been shown to reduce the number of cancer cases diagnosed at a late stage (Paci et al. 2014), and are responsible for approximately 5% of all cancer diagnoses each year (Public Health England 2020).

Making lifestyle changes, attending screening and going to the GP about concerning symptoms can pose significant emotional and practical challenges for many people. Barriers to visiting the GP include embarrassment and fear of wasting the doctor's time (Smits et al. 2016). Barriers to attending screening include fear of pain, embarrassment, lack of time and low perceived risk (Marlow et al. 2015; Waller et al. 2009). And for lifestyle changes, such as eating a healthier diet or being more physically active, motivation is rarely sufficient to change behaviour (Johnston et al. 2004).

Health inequalities are also an important consideration. For most cancers, incidence rates are higher in more deprived groups (Public Health England 2014). One contributing factor is that deprived groups have a greater prevalence of cancer risk factors, including obesity and smoking rates (Lifestyle Team NHS Digital 2018). Deprived groups are also less likely to seek help (Macleod et al. 2009) and to attend screening (Smith et al. 2019), which contribute to later stage diagnosis (Lyratzopoulos et al. 2013) and poorer survival outcomes (Rutherford et al. 2013). Equitable health interventions are needed to ensure that those living in the most deprived areas get the extra help they need to make positive changes for their health and reduce the burden of cancer.

Cancer Research UK (CRUK) run nurse-led community outreach activity in deprived areas to support cancer prevention, early diagnosis and screening. A branch of this outreach activity returns to the same location as regularly as every fortnight. This promotes return visits and an ongoing relationship between visitors and nurses. CRUK previously developed a paper-based tool referred to as the 'healthy life action plan' to support behaviour change in the target audience. The tool was based on a tool developed for cancer survivors which was based on habit-theory and supported

people to develop goal-directed health behaviour habits (Beeken et al. 2017). Habit theory posits that repetition of a behaviour within the same context causes the behaviour to become automatic and ultimately elicited by the context that previously covaried with the behaviour (Lally et al. 2010). Habits develop slowly after many repetitions and once developed do not vary in the face of varying goal states. However, goals can help to direct the development of habits by motivating repetition of a behaviour in a certain context and exposure to that context to elicit habits (Wood and Neal 2007). Developing goal-directed behavioural habits could therefore be one way to help people achieve healthy lifestyle goals (Gardner et al. 2012) and is supported by randomised controlled trials (Beeken et al. 2017).

Aims and Objectives

The current study conducted a process evaluation of the current tool and a behavioural diagnosis of behaviour change attempts in outreach activity visitors in order to redevelop the tool. The study was conducted in four stages. In stage one, a focus group with CRUK nurses was conducted to understand the extent to which the tool was being used, how it was being used (including where it did and did not work well), and acceptability of the tool. In stage 2, observation of outreach activity informed a behavioural diagnosis of behaviour change attempts in the target audience (using the Behaviour Change Wheel; Michie et al. 2011). In stage 3, the intervention was redeveloped by selecting intervention functions and behaviour change techniques (BCTs) to target the barriers and facilitators identified in stage 2, and incorporating the results of stage 1. In stage 4 feedback from key stakeholders was used to refine the redeveloped tools.

Methods

Original intervention

The healthy life action plan was a double-sided A5 card consisting of four steps to developing a new habit. In step 1, visitors think about their normal day and write down 3 ideas for new habits ('goal setting, behaviour' BCT) (Michie et al. 2011). In step 2, visitors identify the health-related goal they want to achieve, and the new habit they will develop to help them achieve this goal ('goal setting, behaviour' BCT). Visitors then develop an action plan consisting of the 3 steps they will take to support development of their new habit (action planning BCT). In step 3 visitors identify what could get in the way of achieving their new habit and write down ways they could deal with this if it were to happen (problem solving BCT). Finally, in step 4, visitors are informed that the more they perform their new behaviour the more it will become a habit, and are encouraged to aim for 60 repetitions of the behaviour to help them achieve their new habit (Lally et al. 2010). Visitors can tick each time they perform their new habit on a numerical timeline ranging from the 1st to the 60th repetition (habit formation and self-monitoring of behaviour, BCTs). Visitors are reminded that sometimes they will forget to perform the new behaviour and that they shouldn't worry if they miss a day or two, but to keep going because they have not failed.

Stage 1: Process evaluation

A focus group with nurses responsible for delivering the outreach activity was conducted to understand the extent to which the tool was being used, how it was being used (including where it did and did not work well), and acceptability of the tool.

Sample

Five nurses took part in the focus group. Opportunistic sampling was used whereby nurses available to attend CRUK's head office were invited to participate.

Procedure

The focus group was facilitated by one researcher and was audio recorded with permission from attendees. Nurses were asked about their experience of using habit theory including challenges/limitations and how much each section of the healthy life action plan was used.

Analyses

The focus group was transcribed verbatim and a thematic analysis was conducted according to the steps of Braun and Clark (Braun and Clarke 2006). The analysis was conducted by one researcher and cross-checked by another.

Stage 2: Behavioural diagnosis

Sample

Outreach activity was observed on location in Newcastle, UK because nurses were known to be using the current healthy life action plan the most, and this provided the

best opportunity to see the tool in action. Average footfall per day at this activity is ~85 visitors.

Procedure

During the observation, nurses running the outreach activity invited the researcher to join in conversations with members of the public when the healthy life action plan was being used, and conversations where behaviour was being discussed but the healthy life action plan was not appropriate. The researcher took detailed descriptive field notes of visitor behaviour and conversations and also documented nurses' accounts of previous conversations with a behaviour change element with visitors.

Analyses

Reflective and analytical field notes were written based on the descriptive field notes and nurses' accounts of previous behaviour change conversations taken during the activity observation (Bogdan and Biklen 1982). These were coded as capability, opportunity and/or motivation barriers/facilitators according to the COM-B model (Michie et al. 2011). Theoretical domains that the intervention needed to target for behaviour change to occur were then identified.

Stage 3: Redeveloping the intervention

Using the APEASE criteria, intervention functions and behaviour change techniques were selected based on the results of the behavioural diagnosis in stage 2. These were then combined with the results of the focus group to redevelop the intervention.

Stage 4: Stakeholder feedback and refinements

Feedback on the redeveloped behaviour change tools was collected from the steering group responsible for planning and overseeing the delivery of the intervention and nurses responsible for delivery. The steering group met (without the researcher present) to discuss the redeveloped tools and provided feedback to the researcher. Nurses were sent the redeveloped materials by email and provided feedback via phone. One nurse manager helped the researcher identify nurses that were interested in providing feedback on the redeveloped tool and three phone calls were conducted. Nurses were asked what they thought of the new tools in general and specific sections of the new tools. Nurses were also asked how they thought the new tools addressed the limitations of the original tool. Refinements were then made to the new behaviour change tools.

Results

Stage 1: Process evaluation

Two key themes were identified from the nurse focus group: value and limitations. In terms of value, two sub-themes were identified: simplicity and the flexible use of habit theory. Habit theory was thought to be simple, easy to understand and explain, and therefore was easy for nurses to integrate into conversations about behaviour change.

"Like when you said about increasing fruit and veg, like just suggesting to somebody take an apple with you for lunch everyday... I know if I've talked to people about that they've thought 'oh yeah that's a simple idea I hadn't really thought of that'... when you show them the card and you say well if you're going to do something more than 60 times then it will become a habit, just keeping it quite simple." (lines 133-7)

The nurses recognized that the healthy life action plan and habit theory were appropriate for some conversations (e.g. health behaviour change conservations) but not others (e.g. where a person had financial difficulties) and so used this very flexibly.

"There's never going to be a case where you use habit theory with every single person today in this setting. It's more about having it up your sleeve where you think it's useful to focus conversations to get someone to commit." (lines 305-8)

"I think it's really good as a tool, it's like an addition I don't feel that it's for everyone, I think you've got to have the flexibility of things but for some people it will work and that's great" (lines 274-6)

In terms of limitations, two sub-themes were identified: lack of time and difficulty applying habit theory to all health behaviours. Nurses often have very brief conversations with members of the public and this made it difficult to complete the healthy life action plan. Sometimes sections of the card were not completed, or visitors were encouraged to complete at home.

"with some of the shorter interactions we have explained that [habit theory] and given them something to go away with" (lines 33-4)

The healthy life action plan was considered less appropriate for some health behaviours, including less frequent behaviours such as screening and visiting the GP, and moderating or stopping, rather than initiating a behaviour.

"I think even for some, the conversations have been about signs and symptoms it might not have been about that [habit]" (lines 148-149)

"it's difficult because we're trying to get them to change a habit or introduce a new habit, whereas a lot of people still will reduce or want to just make adjustments [to a behaviour] so they're not necessarily using it to the full capacity" (lines 40-42)

Stage 2: Behavioural diagnosis

Two types of visitor were identified from the observation: those with high and low readiness to change. For the two types of visitor different aspects of COM-B and theoretical domains were identified as targets for the redeveloped intervention. Those with low readiness to change mostly recognised the need to make a change and

understood the benefits, but often felt negatively about making a change. The healthy life action plan wasn't able to tackle these barriers and people instead required support to increase their readiness to change and feel more positive about making changes (COM-B: automatic motivation, theoretical domain: emotion). Those with high readiness to change knew why they should change, and were motivated to do so, but needed support with creating specific goals (COM-B: reflective motivation, theoretical domain: goals) and adhering to these goals (COM-B: psychological capability, theoretical domain: behavioural regulation). Targeting social influences (COM-B: social opportunity, theoretical domain: social influences), beliefs about capabilities (COM-B: reflective motivation, theoretical domain: beliefs about capabilities) and reinforcing behaviour change attempts (COM-B: automatic motivation, theoretical domain: reinforcement) were also considered likely to help. See Table 1 for a more detailed behavioural diagnosis.

Stage 3: Redeveloping the intervention

Intervention functions

Considering the aspects of COM-B and theoretical domains that need to change in the target audience, three intervention functions were selected: enablement, persuasion and incentivisation. Specifically, for visitors with low readiness the change, the new tools need to enable positivity towards making changes. For visitors with high readiness to change, the new tools need to enable identification of behavioural goals, adherence to goals and access to social support, persuade visitors that they are capable of making changes and incentivise changes.

Other intervention functions did not meet the APEASE criteria. Specifically, education is already a key component of the nurse-led outreach activity and was considered unlikely to support behavioural regulation, change beliefs about capabilities and encourage use of goals. Training and modelling were considered impractical given the typically short interactions with visitors. Environmental restructuring was considered impractical given that nurses cannot change the visitor's environment and the target audience are unlikely to be able to alter their own environment. Coercion was unlikely to be acceptable to the target audience and nurse's delivering the intervention. Restriction was not relevant to the one theoretical domain related to this (social support) as the emphasis of the intervention was on increasing social support. See Table 1 for a more detailed application of the APEASE criteria to identifying intervention functions.

Table 1. Behavioural diagnosis and identifying intervention functions.

COM-B and theoretical domain	Visitor type: high readiness to change	Visitor type: low readiness to change	Intervention functions APEASE criteria fulfilled?
	Is there a need for change?		
Psychology capability			

- Knowledge	No	No	N/A
- Cognitive and interpersonal skills	No	No	N/A
- Memory, attention and decision processes	No	No	N/A
- Behavioural regulation	Yes, these people need support to adhere to their intentions/goals.	No	Education – unlikely to be effective Training – not practicable Modelling – not practicable Enablement - yes
Physical capability - Physical skills	No	No	N/A
Physical opportunity - Environment context and resources	No	No	N/A
Social opportunity - Social influences	Yes, social support may support behaviour change in this audience.	No	Restriction – not relevant Environmental restructuring – not practicable Modelling – not practicable Enablement - yes
Reflective motivation - Beliefs about capabilities	Yes, increasing beliefs about capabilities is likely to support behaviour change in this audience.	No	Education – unlikely to be effective Persuasion - yes Modelling – not practicable Enablement – unlikely to be

			effective
- Beliefs about consequences	No	No	N/A
- Social professional roll and identity	No	No	N/A
- Optimism	No	No	N/A
- Intentions	No	No	N/A
- Goals	Yes, these people need clear goals to help them achieve their behaviour change intentions	No	Education – unlikely to be effective Persuasion – unlikely to be effective Incentivisation – unlikely to be effective Coercion – not acceptable Modelling – unlikely to be effective Enablement - yes
Automatic motivation			
- Reinforcement	Yes, reinforcement could help these people achieve their goals	No	Training – not practicable Incentivisation – yes Coercion – not acceptable Environmental restructuring – not practicable
- Emotion	No	Yes – these people need to feel positively about making changes	Persuasion – unlikely to be effective Incentivisation –

	not practicable Coercion – not acceptable Modelling – not practicable Enablement - yes

Behaviour Change Techniques

After applying the APEASE criteria, the BCTs selected were: reduce negative emotions, pros and cons, goal setting (behaviour), action planning, behavioural contract, commitment, problem solving, social support (unspecified, practical and emotional), self-monitoring of behaviour, self-reward, material reward (behaviour), incentive, verbal persuasion about capability, review behaviour goal(s), discrepancy between current behaviour and goal, and feedback on behaviour.

For those with low readiness to change, considering pros and cons to changing a behaviour and reducing negative emotions about changing should help visitors become motivated to change. For those with high readiness to change, goal setting (behaviour) should help visitors identify achievable behaviour change goals. Creating an action plan and behavioural contract, and verbally committing to this should help visitors adhere to their goals. Problem solving should help visitors anticipate potential obstacles to behaviour change and support them to adhere to their goals. Seeking social support from family and friends should also help visitors achieve their behaviour change goals in the form of emotional and/or practical support. Self-monitoring of behaviour should enable visitors to track their progress and increase confidence when successful, or support changes to their action plan. Planning to self-reward when goals are met should motivate visitors to continue (encompassing incentive and material reward of behaviour). Verbal persuasion about capabilities from the nurses should develop confidence in ability to make changes. Reviewing behaviour goals with the nurses, who provide feedback on behaviour and discuss discrepancies between current behaviour and goals should help keep visitors on track and modify action plans when necessary. See Table A1 in the Appendix for the full list of BCTs considered and application of the APEASE criteria.

The selected BCTs were combined to create two paper-based tools 'Getting Ready to Change' and 'Your Action Plan'. Based on findings from the focus group, the revised tools did not focus on habit theory. They also contained sufficient detail that visitors could use them without nurse support.

Getting Ready to Change

The Getting Ready to Change guide supports visitors with low motivation to change their behaviour to become more motivated in 5 steps. In step 1, visitors write down the behaviour they are thinking about changing, and in step 2 rate on a 1 to 10 scale how ready they are to change this behaviour right now (end-points 'not at all ready' and 'extremely ready'). These steps help the visitor verbalise the behaviour they are thinking about changing and how ready they are to change. In step 3, visitors write down the advantages and disadvantages of changing the behaviour and consider the

balance between advantages and disadvantages (decisional balancing, pros and cons BCT). If the disadvantages outweigh the advantages, in step 4 they are asked to identify ways to reduce the disadvantages (reducing negative emotions BCT) and again compare advantages and disadvantages. In step 5, visitors again rate how ready they are to change this behaviour on the same 1 to 10 scale (end-points 'not at all ready' and 'extremely ready'), enabling progress in readiness to change to be observed by the visitor and nurse. If the visitor scores 7 or lower, they are encouraged to think about what is stopping them from being higher on the scale and what they could do to change this. If they score 8 or higher, they are encouraged to move onto the Your Action Plan guide.

Your Action Plan

The Your Action Plan encourages already motivated visitors to plan how they will achieve a behaviour change. In steps 1 and 2 of the Your Action Plan, visitors write down the behaviour they are thinking about changing (goal setting, behaviour, BCT) and rate how confident they are that they can achieve this goal (1 to 10 scale with end-points 'not at all confident' and 'extremely confident'). The purpose of steps 1 and 2 to are to help the visitor verbalise their goals and confidence in their ability to achieve these. In step 3, visitors create an action plan for how they are going to achieve their new goal by identifying what exactly their goal is, when and where they will perform the behaviour, if they will do it with anyone, and exactly how they will perform the behaviour (goal setting and action planning BCTs). Developing an action plan also constitutes a behavioural contract and a commitment to changing the behaviour (BCTs). In step 4 visitors are asked to consider the barriers and facilitators to achieving their goal and create a plan to either manage or maximise these (problem solving, but also action planning BCTs). For example, visitors are encouraged to seek social support from family and friend (social support, practical, emotional and unspecified BCTs), or to develop if-then plans to help them stick to their goal (Gollwitzer and Sheeran 2006). Visitors rate their confidence in their ability to achieve their goal again in step 5 (1 to 10 scale with end-points 'not at all confident' and 'extremely confident'), and nurses are encouraged to reflect on this and provide positive feedback about the change in confidence (verbal persuasion about capability BCT). In step 6 visitors are encouraged to record their progress by using a diary section to record attempts at changing their behaviour. Visitors are encouraged to record all attempts regardless of success and to comment on the attempt (such as what made it easy/difficult and what they could do differently next time; self-monitoring of behaviour BCT). Finally, in step 7, visitors write down how they will reward themselves when they achieve their goal in a way that doesn't affect progress towards their goal (incentive, self-reward and material reward – behaviour BCTs). Examples include a trip to the cinema or saving up the money that would have been spent on cigarettes and spending it on something else.

Some cancer awareness outreach activity returns to the same location (usually every fortnight) and visitors are encouraged to return for ongoing support. When a visitor returns with their Your Action Plan booklet, nurses review attempts to make changes (feedback on behaviour BCT), reflect on how successful they were compared to their goals (discrepancy between current behaviour and goal BCT) and support the visitor to think about next steps, such as revising the goal (review behaviour goals BCT) or reviewing any other aspect of the plan, such as revising the action plan or further

problem solving.

Stage 4: Stakeholder feedback and refinements

Nurses felt that the revised tools would support them in a wider range of behaviour change conversations than the original healthy life action plan. Nurses also liked the rating scales for readiness to change and confidence in ability to achieve goals. The nurses were familiar with these types of scales and they were considered useful in helping visitors verbalise how they are feeling and visualise progress. The nurses also liked that the new tools were designed with sufficient detail that visitors could use them independently and believed this would help engage more visitors. Both nurses and the steering group recognized the value of self-reward (step 7 in the Your Action Plan), but felt their target audience was unlikely to have the means to do so and so this BCT was removed. See Table 2 for a summary of the intervention development and final content. The final developed tools are available in the Appendix.

Table 2. Summary of COM-B, intervention functions, behaviour change techniques and final intervention content.

COM-B and TDF	Intervention functions	Behaviour Change Techniques selected	Intervention content
Influencing psychological capability			
Behavioural regulation	Enablement	Behavioural contract	Visitors set behaviour change goals
		Commitment	Visitors set behaviour change goals
		Self-monitoring of behaviour	Visitors keep a diary of behaviour change attempts
		Review behaviour goal(s)	Nurses review behaviour goals with visitors after behaviour change attempts
		Discrepancy between current behaviour and goal	Nurses reflect on behaviour change attempts and compare this to behavioural goals
Influencing social opportunity			
Social influences	Enablement	Social support (unspecified, practical,	Visitors think about things that could support them to achieve

		emotional)	their goals, including social support
Influencing reflective motivation			
Beliefs about capabilities	Persuasion	Verbal persuasion about capability	Nurses reflect on increase in confidence in ability to achieve behavioural goals after action planning and goal setting with visitor
Goals	Enablement	Goal setting (behaviour)	Visitors set behaviour change goals
		Action planning	Visitors create an action plan to achieve their new goals
		Problem solving	Visitors identify potential barriers and facilitators to changing their behaviour and plan how they will manage or maximise these
Influencing automatic motivation			
Reinforcement	Incentivisation	Self-monitoring of behaviour	Visitors keep a diary of behaviour change attempts
		Feedback on behaviour	Nurses provide positive feedback on behaviour change attempts
Emotion	Enablement	Pros and cons	Visitors identify pros and cons of changing a behaviour
		Reduce negative emotions	Visitors identify ways to reduce the cons of changing a behaviour

Discussion

The current study conducted a process evaluation of use of a tool to support goal-direct health behaviour habits, and conducted a behavioural diagnosis of behaviour change attempts in outreach activity visitors. Results were used to redevelop the tool and ultimately increase its use and effectiveness. The study was conducted in four stages. In stage one, a focus group was conducted to understand the extent to which the tool was being used, how it was being used (including where it did and did not work well), and acceptability of the tool. In stage 2, observation of outreach activity informed a behavioural diagnosis of behaviour change attempts in the target audience (using the Behaviour Change Wheel; Michie et al. 2011). In stage 3, intervention functions and behaviour change techniques (BCTs) were selected to address the barriers and facilitators identified in the behavioural diagnosis (stage 2). These were combined with the focus group results to redevelop the intervention. In stage 4 feedback from key stakeholders was used to refine the redeveloped tools.

Two new tools were developed: 'Getting Ready to Change' and 'Your Action Plan' guides. The new tools no longer focus on habit theory in order to support a broader range of behavioural changes (e.g. less routine/frequent behaviours such as early diagnosis and screening, or moderating or stopping, rather than initiating a behaviour). They also contain enough information for visitors to use them without a nurse present. The behavioural diagnosis identified aspects of capability, opportunity and motivation that play an important role in making behaviour change attempts in the outreach activity target audience. Enablement, persuasion and incentivisation were the interventions functions selected as most appropriate, practical, likely to be effective, acceptable, safe and equitable to address the barriers and facilitators identified. Behaviour change techniques aligned to these three intervention functions were selected. Each guide contained a sequence of BCTs that would either equip an individual to feel ready to change a health behaviour (Getting Ready to Change guide) or develop a plan of action to achieve their behavioural intentions (Your Action Plan guide).

This work adds to the body of psychological theory and research which distinguishes between individuals motivated and 'amotivated' to change health behaviours (Vallerand 2001), and which argues that different approaches are needed to support behaviour change in each group (Hardcastle et al. 2015). Hardcastle and colleagues argue that amotivation is caused by low levels of self-efficacy, outcome expectancies, effort beliefs and value beliefs. Low outcome expectancies (beliefs that the costs of the behaviour outweigh the benefits) are targeted in the Getting Ready to Change guide. Specifically, users consider the pros and cons of making a change (also known as decisional balancing) and identify ways to reduce the cons, leading to the individual feeling more positive and motivated to make a change (Sawyer et al. 2018). Those already motivated to change their health behaviours require different support to turn their intentions into actions. The Your Action Plan guide combines several BCTs to support those already motivated to make changes, including goal setting and action planning (Kwasnicka et al. 2013), followed by coping planning/problem solving (Koshy et al. 2010) and self-monitoring (Michie et al. 2009). Evidence suggests that coping planning/problem solving combined with action planning can be more effective in

promoting behaviour change than either one alone (Kwasnicka et al. 2013).

Strengths and limitations

The development of these interventions has a strong theoretical basis and took a systematic evidence-based approach, considering all possible intervention functions and relevant BCTs. This ensured the needs of the users informed every step of intervention development. We also addressed feedback from key stakeholders, including nurses responsible for delivery and the steering group. Therefore, the needs of those using the tools and practical considerations about implementation were incorporated into the redevelopment, as recommended by the Medical Research Council when developing complex interventions (Skivington et al. 2018). Involving the nurses and steering group in the creation of the new tools also helped create a sense of ownership that may promote greater use. The use of observational methods enabled the researcher to understand the conversations nurses have with members of the public in a naturalistic setting and the new tools can be used to support any health behaviour where lack of motivation and difficulty turning intentions into behaviour are problematic. A limitation is that only one observation was conducted and observing more outreach activity may have revealed additional insights. The opportunistic sampling of nurses for the focus group may also limit the representativeness of the findings, as those who attended were already interested in the tool and so were presumably using this in conversations.

Future work

These tools now need to be embedded into the outreach activity. This will be achieved through training sessions and "train the trainer" sessions where lead nurses will learn how to train other nurses. Use of the new tools will be monitored through routine data collection. Future work should also assess the impact of the tools on behaviour change and health outcomes.

Conclusions

This study adopted a theory and evidence-based approach to develop two behaviour change tools which equip nurses leading community outreach activity to support health behaviour change in members of deprived communities.

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Appendices

Table A1. Identifying behaviour change techniques.

Intervention function and theoretical domain	Behaviour Change Technique	APEASE criteria fulfilled?
Enablement		
behavioural regulation social influences goals emotion	Social support (unspecified)	Yes
	Social support (practical)	Yes
	Goal setting (behaviour)	Yes
	Goal setting (outcome)	No – not relevant in this context, focus is on behaviour rather than outcomes
	Adding objects to the environment	No - unlikely to be practicable to audience (due to cost)
	Problem solving	Yes
	Action planning	Yes
	Self-monitoring of behaviour	Yes
	Restructuring the physical environment	No - unlikely to be acceptable or practicable to audience (due to cost)
	Review behaviour goal(s)	Yes
	Review outcome goal(s)	N/A
	Social support (emotional)	Yes
	Reduce negative emotions	Yes
	Conserve mental resources	No - unlikely to be effective
	Pharmacological support	No – not relevant in this context
	Self-monitoring of outcome(s) of behaviour	N/A
	Behaviour substitution	No - unlikely to be effective for whole range of

		behaviours e.g. early diagnosis, screening
	Overcorrection	No - unlikely to be acceptable
	Generalisation of a target behaviour	No - unlikely to be effective for whole range of behaviours
	Graded tasks	No - unlikely to be effective for whole range of behaviours
	Avoidance/reducing exposure to cues for the behaviour	No - not relevant to whole range of behaviours
	Restructuring the social environment	No – unlikely to be acceptable to audience
	Distraction	No - not relevant for whole range of behaviours, whereas problem solving is.
	Body changes	No - unlikely to be acceptable to all of target audience (not applicable to wide range of behaviours)
	Behavioural experiments	No - unlikely to be effective
	Mental rehearsal of successful performance	No - unlikely to be acceptable or effective
	Focus on past success	No - unlikely to be effective and equitable
	Self-talk	No - unlikely to be effective
	Verbal persuasion about capability	No – unlikely to be effective (although see persuasion)
	Self-reward	No - unlikely to be effective (although see incentivisation)
	Behavioural contract	Yes
	Commitment	Yes
	Discrepancy between current behaviour and goal	Yes
	Pros and cons	Yes
	Comparative imagining of future outcomes	No - unlikely to be effective

	Valued self-identity	No - unlikely to be effective
	Framing/reframing	No - unlikely to be effective
	Incompatible beliefs	No - unlikely to be effective
	Identity associated with changed behaviour	No - unlikely to be effective for whole range of behaviours
	Identification of self as role model	No - unlikely to be effective for whole range of behaviours
	Salience of consequences	No - unlikely to be effective
	Monitoring of emotional consequences	No - unlikely to be effective
	Anticipated regret	No - unlikely to be acceptable
	Imaginary punishment	No - unlikely to be effective or acceptable
	Imaginary reward	No - unlikely to be effective
	Vicarious consequences	No - unlikely to be effective
Persuasion		
beliefs about capabilities	Credible source	No – not relevant in this context
	Information about social and environmental consequences	No – unlikely to be effective
	Information about health consequences	No – unlikely to be effective
	Feedback on behaviour	No – unlikely to be effective (although see incentivisation)
	Feedback on outcome(s) of the behaviour	No – not relevant in this context
	Biofeedback	No – not relevant in this context
	Re-attribution	No – not relevant in this context
	Focus on past success	No – not relevant in this context
	Verbal persuasion about capability	Yes

	Framing/reframing	No – not relevant in this context
	Identity associated with changed behaviour	No – not relevant in this context
	Identification of self as role model	No – unlikely to be effective
	Information about emotional consequences	No – unlikely to be effective
	Salience of consequences	No – unlikely to be effective
	Information about others' approval	No – unlikely to be effective
	Social comparison	No – unlikely to be effective
Incentivisation		
reinforcement	Feedback on behaviour	Yes
	Feedback on outcome(s) of behaviour	No – not relevant in this context
	Monitoring of behaviour by others without evidence of feedback	No – unlikely to effective or practicable to all
	Monitoring outcome of behaviour by others without evidence of feedback	No – not relevant in this context
	Self-monitoring of behaviour	Yes
	Paradoxical instructions	No – not acceptable
	Biofeedback	No – not relevant in this context
	Self-monitoring of outcome(s) of behaviour	No – not relevant in this context
	Cue signalling reward	No – not relevant in this context

	Remove aversive stimulus	No – unlikely to be practicable or relevant to all behaviours
	Reward approximation	No – unlikely to be effective
	Rewarding completion	No – unlikely to be effective
	Situation-specify reward	No – unlikely to be effective
	Reward incompatible behaviour	No – unlikely to be effective
	Reduce reward frequency	No – unlikely to be effective or acceptable
	Reward alternate behaviour	No – unlikely to be effective
	Remove punishment	No – unlikely to be effective
	Social reward	No – unlikely to be practicable for all
	Material reward (behaviour)	Yes
	Material reward (outcome)	No – not relevant in this context
	Self-reward	Yes
	Non-specific reward	No - unlikely to be effective
	Incentive	Yes
	Behavioural contract	No – unlikely to be effective (although see enablement)
	Commitment	No – unlikely to be effective (although see enablement)
	Discrepancy between current behaviour and goal	No – unlikely to be effective (although see enablement)
	Imaginary reward	No – unlikely to be effective

Your behaviour change guide:

Getting ready to change

Deciding whether you're ready to change a behaviour is an important decision. This section will help you to see if you're ready.

Step 1: What is the behaviour you are thinking about changing?

.....

.....

Step 2: How ready are you to change this behaviour right now?
It's okay if you're not ready just yet, the next steps will help you to think about this. Circle a number on the line below.

Not at all ready — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10 — Extremely ready

Step 3: Write down the advantages and disadvantages of changing the behaviour in the boxes below.

	Advantages		Disadvantages
1)	e.g. I may lose weight	1)	I can't eat the things I like as much
2)		2)	
3)		3)	

Weigh up the advantages and disadvantages that you came up with. If you came up with more advantages than disadvantages, you might be ready to change (if so, skip to step 5). If you came up with more disadvantages than advantages, or there is a disadvantage that is particularly important to you, move on to step 4.

Step 4: For each of the disadvantages you came up with, think of a way you can reduce this.

1) e.g. I can still eat the things I like sometimes .....

.....

2) .....

.....

3) .....

.....

Step 5: How ready are you to change this behaviour now?
Circle a number on the line below.

Not at all ready — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10 — Extremely ready

If you said 8 or higher, it sounds like you are ready to change! Ask a nurse about the Your Action Plan to help you plan how you will achieve your new goal.

If you put 7 or lower, think about what's stopping this from being higher on the scale and what you could do to change this.

Your behaviour change guide:

Your action plan

Simple steps – small lifestyle changes can make a real difference to your health. This plan will help you find ways to make changes in the area you have identified.

Step 1: What is the behaviour you are thinking about changing?

.....

.....

Step 2: How confident do you feel that you can achieve this goal?
Circle a number on the line below.

Not at all ready — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10 — Extremely ready

Step 3: Let's plan how you are going to achieve this goal.
Think about the steps you can take to achieve your new goal. It can help to think about what, when, where, with whom, and how you are going to achieve your goal.

What (goal)	When	Where	With whom	How
e.g. do more walking	In the morning	On the way to work	With friend at work who gets the bus too	Get off 1 stop early

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Step 4: What might get in the way and what might help?

It can be helpful to think about what might make it harder and what might make it easier for you to achieve your goal. That way you can plan how you will deal with these or make sure they happen.

Things that could make it harder or easier to achieve your goals might be the places or things around you, the people you spend time with, your thoughts and feelings.

What might make it harder or easier to achieve your goals?	How might you deal with this or make sure it happens?
e.g. If someone offers me a biscuit at work.	e.g. Then I will say no thank you.
e.g. Support from friends/family would help me to stick to my goal.	e.g. I will tell friends/family about my new goal and ask them to support me in this.

Step 5: How confident do you feel that you can achieve this goal now?

Circle a number on the line below.

Not at all ready — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10 — Extremely ready

If you put 7 or lower, what can you do to change this? Are there any barriers you haven't considered? Is there another goal that is more important to you?

Step 6: Recording your progress.

Use this section to keep track of your progress, making a note of all attempts to achieve your goal. It's a great confidence booster when you can see that you're doing well, but it can also help you to understand why you might be struggling.

We all forget things sometimes and some days will be harder than others. Don't worry if you miss a day or two, keep going because you haven't failed.

Goal	Date	Did you do it? Yes / No / Partly	Comments What made it easy? What made it difficult? What could you do differently next time?
e.g. Eat more fruit	Monday – Wednesday	partly	Ran out of fruit mid-week. Need to buy more fruit during the weekly food shop.

Visit www.cruk.org/health to learn more about how to help reduce the risk of cancer.

Visit www.cruk.org/spotcancerearly for more about the signs and symptoms of cancer.

Find information about cancer at www.cruk.org/about-cancer.

Talk to a Cancer Research UK cancer nurse on Freephone 0808 800 4040 (Monday to Friday, 9am – 5pm).

Get support from others on our online forum at www.cruk.org/cancerchat.

We would love to hear how you are getting on since your visit. You can share your story confidentially at www.cruk.org/roadshow.

Discover where our team will be going next at www.cruk.org/roadshowmap.

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