

# Online Research @ Cardiff

This is an Open Access document downloaded from ORCA, Cardiff University's institutional repository: <http://orca.cf.ac.uk/75575/>

This is the author's version of a work that was submitted to / accepted for publication.

Citation for final published version:

Elwyn, Glyn, Marrin, Katy, Frosch, Dominick and White, James 2014. Sustainable Change Sequence: a framework for developing behavior change interventions for patients with long-term conditions. *European Journal for Person Centered Healthcare* 2 (2) , pp. 212-216.  
10.5750/ejpch.v2i2.736 file

Publishers page: <http://dx.doi.org/10.5750/ejpch.v2i2.736>  
<<http://dx.doi.org/10.5750/ejpch.v2i2.736>>

Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the publisher's version if you wish to cite this paper.

This version is being made available in accordance with publisher policies. See <http://orca.cf.ac.uk/policies.html> for usage policies. Copyright and moral rights for publications made available in ORCA are retained by the copyright holders.



ARTICLE

## Sustainable Change Sequence: a framework for developing behavior change interventions for patients with long-term conditions

Glyn Elwyn BA MB BCh MSc PhD FRCGP<sup>a</sup>, Katy Marrin BSc MSc<sup>b</sup>, Dominick L. Frosch PhD<sup>c</sup> and James White PhD<sup>d</sup>

a Clinical Professor, Cochrane Institute of Primary Care and Public Health, Cardiff University, Heath Park, Cardiff, UK & Visiting Professor and Senior Scientist, The Dartmouth Center for Health Care Delivery Science, Hanover, NH, USA

b Research Associate, Cochrane Institute of Primary Care and Public Health, Cardiff University, Heath Park, Cardiff, UK

c Consulting Investigator, Department of Health Services Research, Palo Alto Medical Foundation Research Institute, Palo Alto; Associate Adjunct Professor of Medicine, University of California, Los Angeles and Fellow, Patient Care Program, Gordon and Betty Moore Foundation, Palo Alto, CA, USA

d Research Associate in Social Epidemiology, Institute of Primary Care and Public Health, Cardiff University, Heath Park, Cardiff, UK

### Abstract

**Objective:** Interactive interventions are increasingly advocated to support behavior change for patients who have long-term conditions. Such interventions are most likely to achieve behavior change when they are based on appropriate theoretical frameworks. Developers of interventions are faced with a diverse set of behavioral theories that do not specifically address intervention development. The aim of our work was to develop a framework to guide the developers of interactive healthcare interventions that was derived from relevant theory and which guided developers towards appropriate behavior change techniques within a person-centered approach.

**Methods:** We reviewed theories that inform behavior change interventions, where relevant to the management of long-term conditions. Theoretical constructs and behavior change techniques were grouped according to similarity in aims.

**Results:** We developed a logic model that operationalizes behavior change theories and techniques into 5 steps likely to lead to sustained behavior change. The steps are: 1) create awareness of need; 2) facilitate learning; 3) enhance motivation; 4) prompt behaviour change & 5) ensure sustainability of behaviour change.

**Conclusion and practice implications:** A framework that sequences behavioural change techniques along a sustainability model provides a practical template for the developers of interactive healthcare applications and interventions and can be integrally applied within individualized care strategies.

### Keywords

Behavioral medicine, chronic illness, logic model, long term conditions, person-centered healthcare self-management interventions

### Correspondence address

Professor Glyn Elwyn, The Dartmouth Center for Health Care Delivery Science, Dartmouth College, 37 Dewey Field Road, HB 7256, Hanover, NH 03755, USA. E-mail: glynelwyn@gmail.com

Accepted for publication: 11 June 2013

## Introduction

Individuals with long-term conditions are encouraged to self-manage their conditions [1]. However, the knowledge base and skills required for optimal self-management often require lifestyle modifications that almost always demand multiple and therefore difficult changes in behavior. To meet this challenge, an increasing number of interactive self-management interventions or applications are being developed [2,3]. Despite guidance that these interventions should be based on sound theoretical frameworks, intervention developers are challenged by the large number

of behavioural theories that have been proposed, not knowing where to begin, or which theory best fits their needs [4-6]. The goal of this article is to propose a logic model, based on the main relevant theories of behavioural change that provides a practical way forward for developers who are keen to follow best practice, but who are not necessarily able to keep easily abreast of theoretical developments.

Interventions that draw on behavior change theory are hypothesized to be more effective because they target causal determinants of behavior and are more likely to facilitate an understanding of what works across different contexts and populations, for example, UK Medical

Research Council guidance [5]. The typical intervention provided to patients with long-term conditions targets single behaviors rather than the multiple behavioral changes often needed. These interventions rely on the assumption that people will also sustain multiple behavioral changes to lifestyle, as well as also monitoring symptoms and adapting treatment regimens. In reality, changes to behavior occur gradually, ahead of becoming habitual, often requiring ongoing support and where relapses are common [7,8]. Self-management interventions require integration into the wider family and / or health system to enable effective use [9]. The use of interactive healthcare applications, for example, has increasingly been seen as a means for delivering these interventions, where information technology is harnessed to teach and guide patient behavior [2,3]. Yet, despite the potential of these technologies, existing behavioral theory is seldom employed to develop these interventions [10,11].

The goal of many self-management interventions for patients with long-term conditions is to reduce the risk of preventable exacerbations. These interventions also attempt to reduce the risk of future complications - for example, by promoting sugar and blood pressure control in diabetes [10]. Patients are often asked to monitor a prognostic indicator, for example, blood glucose levels. This commonly takes the form of a goal to keep indicators under a risk threshold. There is no clear evidence that self-management interventions are effective in meeting the behavior challenges faced by patients with long-term conditions [1]. The degree to which self-management interventions have been successful at either individual level, or can be successfully integrated into wider support systems, is also unclear [12]. Cochrane reviews evaluating self-management interventions for long-term conditions such as asthma, chronic obstructive pulmonary disease and diabetes, suggest most have produced only small changes of limited clinical benefit. Their content has been mainly focused on knowledge acquisition about common symptoms and techniques for managing physical exacerbations [13-15]. Few studies included specific goal setting, external checking of goals or integration into healthcare systems [16]. Furthermore, many trials focused on 'proxy' outcomes, which may not accurately reflect actual changes in behavior. For instance, self-management interventions have been associated with a small reduction in symptoms (e.g., reduction in dyspnoea; weighted mean difference -0.53; 95% CI -0.96 to -0.10) and in hospital admissions (e.g., number needed to treat of 24; 95% CI 16 to 80) in individuals with chronic obstructive pulmonary disease [14]. However, most of these interventions did not review adherence to behavioral goals necessary to achieve these outcomes (e.g., attendance at exercise sessions) and few followed up patients for more than 18 months. Patients may fail to incorporate them into their lives [17].

The gap between the hope that that self-management will deliver behavior change and the actual attainment of patient goals may be due, in part at least, to a lack of guidance on how to develop interventions that recognize the complex sequence of moving from an awareness of the need to change, to the final steps of integrating behavior

change into individualized routines that become an automatic part of the daily habits of the patient.

## Method

We developed a logic model to structure the development of behavior change interventions [18]. The logic model was informed by a review of behavior change interventions targeted at 4 long-term conditions (type 2 diabetes, asthma, COPD and heart disease) [19]. Social Cognitive Theory [20], the Transtheoretical Model [21] and Self-Regulation Theory [22] were among the most commonly cited theories used in the development and content of interventions. We then categorized the constructs from these theories that influence behavior change and that predict behavior change. Drawing on our reading of the literature and experience of behavior change techniques and interventions [23,24], we identified gaps in the use of these constructs [19]. We observed that few interventions attempted to enhance *motivation*, bring about self-management or had a plan to *sustain* behavior change.

## Results

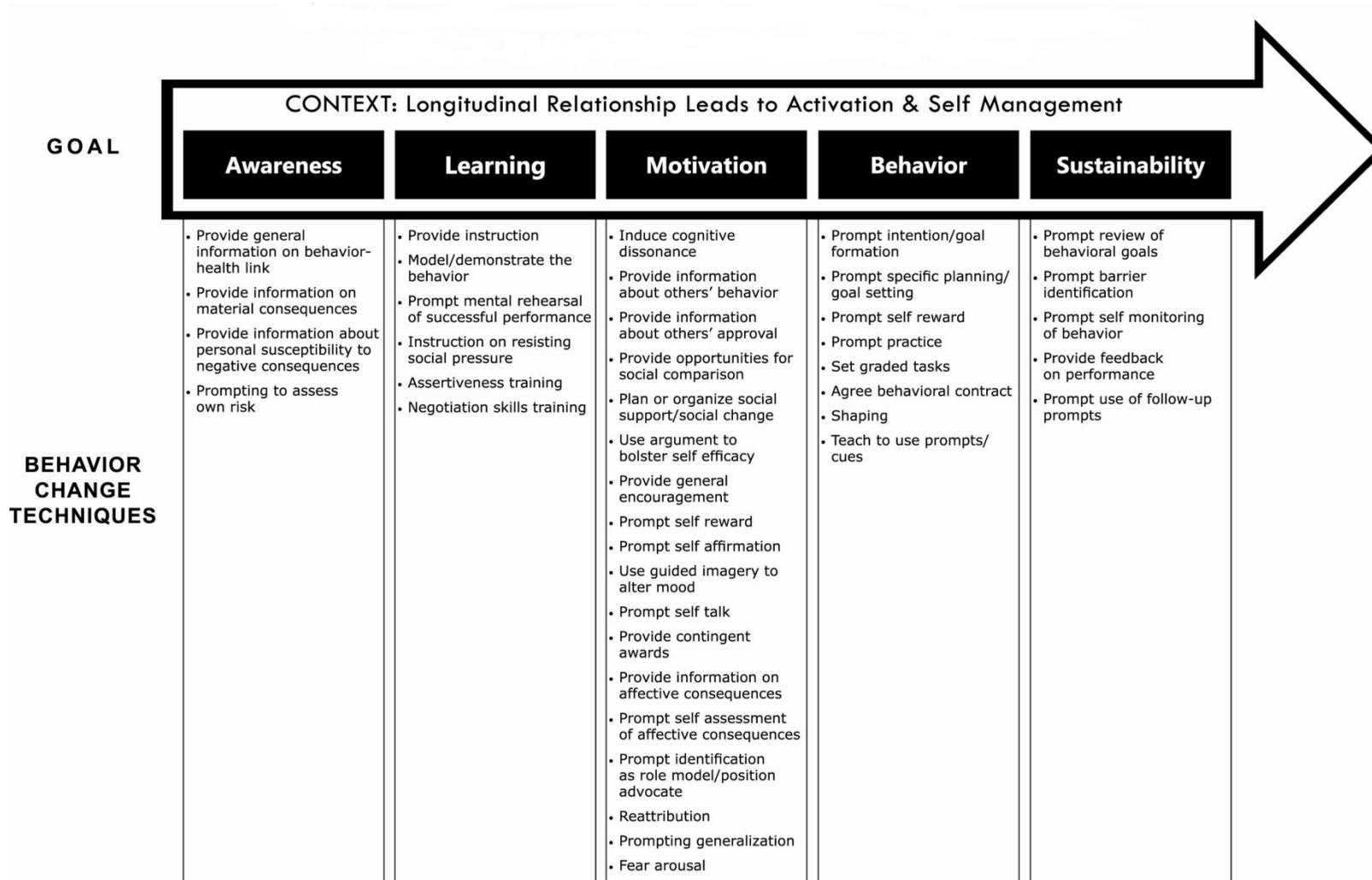
The logic model operationalizes behavior change theories into 5 steps that are the most likely to lead to sustained behavior change. The model is designed to act as a guide to intervention developers, to help them identify appropriate content by mapping the behavior change techniques identified in Abraham and Michie's taxonomy [25] against successive steps. If developers notice gaps in intervention content, they should consider which behavior change techniques might best support patients to achieve each step towards attaining *sustained* changes in behavior.

Figure 1 shows the 5 distinct steps to achieve sustained behaviour change: (1) Awareness - raising the individuals awareness of the link between specific behaviour and risk, for example, high blood pressure and sugar levels in individuals who have diabetes; (2) Learning - providing information to the individual on how they could and why they should change their behaviour to reduce risk levels of future illness; (3) Motivation - motivating and encouraging the individual to change their behaviour in the required direction; (4) Behaviour - supporting the individual in undertaking the specific behaviour change & (5) Sustainability - ensuring that the behaviour change is sustained over the long-term and after the initial intervention to induce behaviour change has ended.

The behavior change techniques listed are not exhaustive. We suggest that intervention developers identify where intervention content might be required to support patients; for example, how best to generate motivation after learning about the relevance of a change in behavior, or how to sustain a behavior after having being motivated to initiate it.

By separating behaviour change into distinct steps the model explicitly acknowledges that people with long-term

Figure 1 Sustainable Change Sequence: a logic model for developing self-management support interventions



illnesses are at different stages in their behaviour change journey. For example, moving from awareness to sustained behaviour change may be inappropriate for an individual recently diagnosed with type 2 diabetes. The gap between knowing *why* something is important (awareness) is a critical initial step and one that is often overlooked. The gap between *knowing what to do* and *doing it regularly* (behaviour change) is difficult for many people to navigate, often because they have a low motivation, or unresolved ambivalence about the urgency of making changes when faced with other priorities. In this situation, an intervention comprising of behavior change techniques to enhance motivation and prompt and sustain behaviour change may be more appropriate than one focusing on creating awareness of the link between protective behaviours and good health. Likewise, an individual who has successfully changed behaviour in the short term (e.g., losing weight) may need support in the long-term to sustain this change and may benefit from intervention content to maintain change (e.g., re-setting goals or relapse prevention).

This logic model is distinct from the approach proposed in the Transtheoretical Model [21]. The Transtheoretical Model seeks to *explain* the process of behaviour change by proposing that individuals move from pre-contemplation to action, by progression through a series of stages [21]. The logic model we propose does not have the same ambition. Rather, the goal is to act as a framework for intervention developers, so that they can assess whether their efforts would help individuals understand the need for change and then act to support the process of learning, acting and sustaining change. The critical difference is that the model illustrates where behaviour change techniques could be used in sequence to enhance the chances of success and which techniques that can be applied, adapted and revisited according to an individual's personal circumstances.

Although most self-management interventions will have content that will aim to increase awareness, increase learning and promote motivation, few interventions include components to initiate and sustain changes in behaviour. We also note that relationships between patients and their providers will influence the success of these interventions. Encouragement by health professionals may well be critical in achieving the sustained change. While the goals of creating *awareness* and achieving *learning* can be delivered by standalone programs (e.g., those offered on DVD or websites), it is unlikely that these tools in isolation can successfully attain motivation and sustained behaviour change [26,27].

## Discussion and Conclusion

The logic model offers a pragmatic method of identifying the required components of an intervention to produce long-term self-management: it operationalizes behavior change theories into concrete steps into which well-described behavior change techniques fit and have the best chance of success. In order to help individual patients to

self-manage long-term conditions, interventions need to be organized according to a model that explicitly addresses the need to provide a sequence of behavior change techniques and which does so within a person-centered, relationship based context. Organizations that develop behavior change interventions are adopting this logic model to evaluate and enhance their tools [28,29].

## Acknowledgements, funding and conflicts of interest

We acknowledge the contribution of Stephen Rollnick, Ronald M. Epstein and Catherine Serio to the generation of the research report, on which this article is based. The work was sponsored by the Informed Medical Decisions Foundation (grant number 0168-1) 40 Court Street, Suite 300, Boston, MA 02108, USA. James White receives support from The Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement (DECIPHer), a UKCRC Public Health Research Centre of Excellence. Funding from the British Heart Foundation, Cancer Research UK, Economic and Social Research Council (RES-590-28-0005), Medical Research Council, the Welsh Government and the Wellcome Trust (WT087640MA), under the auspices of the UK Clinical Research Collaboration, is gratefully acknowledged. Glyn Elwyn and Dominick L. Frosch have received grants and travel honoraria from the Informed Medical Decisions Foundation. Glyn Elwyn has an advisory role for Emmi Solutions, a developer of patient decision support tools. The authors report no conflicts of interest.

## References

- [1] Chodosh, J., Morton, S.C., Mojica, W., Maglione, M., Suttorp, M.J., Hilton, L., Rhodes, S. & Shekelle, P. (2005). Meta-analysis: chronic disease self-management programs for older adults. *Annals of Internal Medicine* 143, 427-438.
- [2] Murray, E., Burns, J., See, T.S., Lai, R. & Nazareth, I. (2004). Interactive Health Communication Applications for people with chronic disease. *Cochrane Database of Systematic Reviews* CD004274.
- [3] Pearson, M.L., Mattke, S., Shaw, R., Ridgely, M.S. & Wiseman, S.H. (2007). Patient Self-Management Support Programs: An Evaluation. Final Contract Report. AHRQ Publication No. 08-0011, Rockville, MD.
- [4] Campbell, M., Fitzpatrick, R., Haines, A., Kinmonth, A., Sandercock, P., Spiegelhalter, D. & Tyrer, P. (2000). Framework for design and evaluation of complex interventions to improve health. *British Medical Journal* 321, 694.
- [5] Campbell, N.C., Murray, E., Darbyshire, J., Emery, J., Farmer, A., Griffiths, F., Guthrie, B., Lester, H., Wilson, P. & Kinmonth, A.L. (2007). Designing and evaluating complex interventions to improve health care. *British Medical Journal* 334, 455.

- [6] Michie, S., Johnston, M., Francis, J., Hardeman, W. & Eccles, M. (2008). From Theory to Intervention: Mapping Theoretically Derived Behavioural Determinants to Behaviour Change Techniques. *Applied Psychology* 57, 660-680.
- [7] Mohiuddin, S.M., Mooss, A.N., Hunter, C.B., Grollmes, T.L., Cloutier, D.A. & Hilleman, D.E. (2007). Intensive smoking cessation intervention reduces mortality in high-risk smokers with cardiovascular disease. *Chest* 131, 446-452.
- [8] Tashkin, D., Kanner, R., Bailey, W., Buist, S., Anderson, P., Nides, M., Gonzales, D., Dozier, G., Patel, M.K. & Jamerson, B. (2001). Smoking cessation in patients with chronic obstructive pulmonary disease: a double-blind, placebo-controlled, randomised trial. *Lancet* 357, 1571-1575.
- [9] Wedzicha, J.A. & Vestbo, J. (2012). Can patients with COPD self-manage? *Lancet* 380, 624-625.
- [10] Bodenheimer, T., Lorig, K., Holman, H. & Grumbach, K. (2002). Patient self-management of chronic disease in primary care. *Journal of the American Medical Association* 288, 2469-2475.
- [11] French, S.D., Green, S.E., O'Connor, D.A., McKenzie, J.E., Francis, J.J., Michie, S., Buchbinder, R., Schttner, P., Spike, N. & Grimshaw, J.M. (2012). Developing theory-informed behaviour change interventions to implement evidence into practice: a systematic approach using the Theoretical Domains Framework. *Implementation Science* 7, 38.
- [12] Coleman, K., Mattke, S., Perrault, P.J. & Wagner, E.H. (2009). Untangling practice redesign from disease management: how do we best care for the chronically ill? *Annual Review of Public Health* 30, 385-408.
- [13] Gibson, P.G., Coughlan, J., Wilson, A.J., Abramson, M., Bauman, A., Hensley, M.J. & Walters, E.H. (2003). Self-management education and regular practitioner review for adults with asthma. *Cochrane Database of Systematic Reviews* 1 CD001117.
- [14] Effing, T., Monnikhof, E., van der Valk, P., van der Palen, J., van Herwaarden, C., Partidge, M., Walters, E.H. & Zielhuis, G.A. (2007). Self-management education for patients with chronic obstructive pulmonary disease. *Cochrane Database of Systematic Reviews* CD002990.
- [15] Vermeire, E., Wens, J., Van Royen, P., Biot, Y., Hearnshaw, H. & Lindenmeyer, A. (2005). Interventions for improving adherence to treatment recommendations in people with type 2 diabetes mellitus. *Cochrane Database of Systematic Reviews* CD003638.
- [16] Bourbeau, J., Julien, M., Maltais, F., Rouleau, M., Beupré, A., Bégin, R. *et al.* (2003). Reduction of hospital utilization in patients with chronic obstructive pulmonary disease: a disease-specific self-management intervention. *Archives of Internal Medicine* 163, 585-591.
- [17] Moskowitz, D. & Bodenheimer, T. (2011). Moving from evidence-based medicine to evidence-based health. *Journal of General Internal Medicine* 26, 658-660.
- [18] Anderson, L.M.L., Petticrew, M., Rehfuss, E., Armstrong, R., Ueffing, E., Baker, P., Francis, D. & Tugwell, P. (2011). Using logic models to capture complexity in systematic reviews. *Research Synthesis Methods* 2, 33-42.
- [19] Elwyn, G., Marrin, K., Epstein, R., Rollnick, S., White, J. & Frosch, D. (2010). From theories to interventions: the conceptualisation and development of interventions for supporting behaviour change for people with long term medical conditions. Boston, MA: Informed Medical Decisions Foundation.
- [20] Bandura, A. (1985). *Social Foundations of Thought and Action: A Social Cognitive Theory*. New York: Prentice Hall.
- [21] Prochaska, J. & Velicer, W. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion* 12, 38-48.
- [22] Nerenz, D. & Leventhal, H. (1983). Self-regulation theory in chronic illness. In: *Coping with Chronic Disease: Research and Applications*, (Burish, T.G. & Bradley, L.A., eds.) pp.13-37. Burlington, MA: Academic Press Inc.
- [23] Elwyn, G., Frosch, D. & Rollnick, S. (2009). Dual equipoise shared decision-making: definitions for decision and behaviour support interventions. *Implementation Science* 4, 75-78.
- [24] Rollnick, S., Butler, C.C., McCambridge, J., Kinnersley, P., Elwyn, G. & Resnicow, K. (2005). Consultations about changing behaviour. *British Medical Journal* 331, 961-963.
- [25] Abraham, C. & Michie, S. (2008). A taxonomy of behavior change techniques used in interventions. *Health Psychology* 27, 379-387.
- [26] Ngo, V., Hammer, H. & Bodenheimer, T. (2010). Health coaching in the teamlet model: a case study. *Journal of Internal General Medicine* 25, 1375-1378.
- [27] Abraham, C., Kok, G., Schaalma, H. & Luszczynska, A. (2010). Health Promotion. In: *Handbook of Applied Psychology*, (Martin, P.R., Cheung, F.M., Knowles, M.C., Kyrios, M., Littlefield, L., Overmier, J.B. & Prieto, J. M., eds.), pp. 83-111. Oxford: Wiley-Blackwell.
- [28] Healthwise, Healthwise Inc. (2008). Which test should I have to screen for colorectal cancer? 2008; Available at: <http://www.webmd.com/colorectal-cancer/which-test-should-i-have-to-screen-for-colorectal-cancer>. Accessed: June 5, 2012.
- [29] Informed Medical Decisions Foundation, Long-term Conditions Programs. (2012). (Accessed: 1st June 2012 at <http://informedmedicaldecisions.org/category/da-programs/long-term-condition-programs/>).