

# Developing an evidence-based online method of linking behaviour change techniques and theoretical mechanisms of action: a multiple methods study

Susan Michie,<sup>1\*</sup> Marie Johnston,<sup>2</sup>  
Alexander J Rothman,<sup>3</sup> Marijn de Bruin,<sup>2,4</sup>  
Michael P Kelly,<sup>5</sup> Rachel N Carey,<sup>1</sup>  
Lauren EC Bohlen,<sup>1,6</sup> Hilary NK Groarke,<sup>7</sup>  
Niall C Anderson<sup>1,8</sup> and Silje Zink<sup>1,9</sup>

<sup>1</sup>Centre for Behaviour Change, University College London, London, UK

<sup>2</sup>Institute of Applied Health Sciences, College of Life Sciences and Medicine, University of Aberdeen, Aberdeen, UK

<sup>3</sup>Department of Psychology, University of Minnesota, Minneapolis, MN, USA

<sup>4</sup>Radboud University Medical Center, Radboud Institute for Health Sciences, IQ Healthcare, Nijmegen, the Netherlands

<sup>5</sup>Primary Care Unit, Cambridge Institute of Public Health, University of Cambridge, Cambridge, UK

<sup>6</sup>Department of Kinesiology, College of Health Sciences, University of Rhode Island, Kingston, RI, USA

<sup>7</sup>Department of Psychology, National University of Ireland Galway, Galway, Ireland

<sup>8</sup>National Institute for Health Research (NIHR) Health Protection Research Unit in Behavioural Science and Evaluation, University of Bristol, Bristol, UK

<sup>9</sup>National Advisory Unit on Rehabilitation in Rheumatology, Diakonhjemmet Hospital, Oslo, Norway

\*Corresponding author [s.michie@ucl.ac.uk](mailto:s.michie@ucl.ac.uk)

**Declared competing interests of authors:** none

Published January 2021

DOI: 10.3310/hsdr09010

## Plain English summary

Linking BCTs and theoretical MoAs

Health Services and Delivery Research 2021; Vol. 9: No. 1

DOI: [10.3310/hsdr09010](https://doi.org/10.3310/hsdr09010)

NIHR Journals Library [www.journalslibrary.nihr.ac.uk](http://www.journalslibrary.nihr.ac.uk)

## Plain English summary

To improve many of the world's most important health challenges, people need to change behaviours such as unhealthy eating and smoking. Research has helped, but we need to know more about how interventions work in changing behaviour. Our study looked at reports of published interventions to change behaviour and the views of experts in the field to advance our knowledge.

First, we examined links made between behaviour change techniques (the active components that bring about behaviour change, e.g. feedback on behaviour) and their mechanisms of action (the processes through which a behaviour change technique affects behaviour, e.g. behavioural regulation) in 277 published intervention reports. Second, we investigated the consensus among 105 behaviour change experts about the strength of agreement between behaviour change techniques and mechanisms. Study 3 aimed to resolve uncertainties among experts and discrepancies between the published reports. The summarised results identified 92 'links' (i.e. agreement that a link is present between a particular technique and mechanism to change behaviour) and 465 'non-links' (i.e. agreement that a link is not present). The final study investigated links between groups of techniques and theories as a whole (e.g. self-regulation theory) rather than the mechanisms used in individual theories. It was possible to identify techniques frequently used together and for experts to draw out some overarching theories from particular combinations.

The findings could be useful to policy-makers, intervention designers and practitioners for designing, improving and tailoring interventions. They may also be useful to researchers investigating the theoretical basis of interventions. To maximise the usefulness of this research, the findings are available in an open access interactive online tool (<https://theoryandtechniquetool.humanbehaviourchange.org/>; accessed 1 March 2020) that also enables discussion and collaboration.



ISSN 2050-4349 (Print)

ISSN 2050-4357 (Online)

This journal is a member of and subscribes to the principles of the Committee on Publication Ethics (COPE) ([www.publicationethics.org/](http://www.publicationethics.org/)).

Editorial contact: [journals.library@nihr.ac.uk](mailto:journals.library@nihr.ac.uk)

The full HS&DR archive is freely available to view online at [www.journalslibrary.nihr.ac.uk/hsdr](http://www.journalslibrary.nihr.ac.uk/hsdr). Print-on-demand copies can be purchased from the report pages of the NIHR Journals Library website: [www.journalslibrary.nihr.ac.uk](http://www.journalslibrary.nihr.ac.uk)

## Criteria for inclusion in the *Health Services and Delivery Research* journal

Reports are published in *Health Services and Delivery Research* (HS&DR) if (1) they have resulted from work for the HS&DR programme or, commissioned/managed through the Methodology research programme (MRP), and (2) they are of a sufficiently high scientific quality as assessed by the reviewers and editors.

Reviews in *Health Services and Delivery Research* are termed 'systematic' when the account of the search appraisal and synthesis methods (to minimise biases and random errors) would, in theory, permit the replication of the review by others.

## HS&DR programme

The HS&DR programme funds research to produce evidence to impact on the quality, accessibility and organisation of health and social care services. This includes evaluations of how the NHS and social care might improve delivery of services.

For more information about the HS&DR programme please visit the website at <https://www.nihr.ac.uk/explore-nihr/funding-programmes/health-services-and-delivery-research.htm>

## This report

This issue of the *Health Services and Delivery Research* journal series contains a project commissioned/managed by the Methodology research programme (MRP). The Medical Research Council (MRC) is working with NIHR to deliver the single joint health strategy and the MRP was launched in 2008 as part of the delivery model. MRC is lead funding partner for MRP and part of this programme is the joint MRC-NIHR funding panel 'The Methodology Research Programme Panel'.

To strengthen the evidence base for health research, the MRP oversees and implements the evolving strategy for high-quality methodological research. In addition to the MRC and NIHR funding partners, the MRP takes into account the needs of other stakeholders including the devolved administrations, industry R&D, and regulatory/advisory agencies and other public bodies. The MRP funds investigator-led and needs-led research proposals from across the UK. In addition to the standard MRC and RCUK terms and conditions, projects commissioned/managed by the MRP are expected to provide a detailed report on the research findings and may publish the findings in the HS&DR journal, if supported by NIHR funds.

The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HS&DR editors and publisher have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the draft document. However, they do not accept liability for damages or losses arising from material published in this report.

This report presents independent research funded under a MRC-NIHR partnership. The views and opinions expressed by authors in this publication are those of the authors and do not necessarily reflect those of the NHS, the NIHR, the MRC, NETSCC, the HS&DR programme or the Department of Health and Social Care. If there are verbatim quotations included in this publication the views and opinions expressed by the interviewees are those of the interviewees and do not necessarily reflect those of the authors, those of the NHS, the NIHR, the MRC, NETSCC, the HS&DR programme or the Department of Health and Social Care.

© Queen's Printer and Controller of HMSO 2021. This work was produced by Michie *et al.* under the terms of a commissioning contract issued by the Secretary of State for Health and Social Care. This issue may be freely reproduced for the purposes of private research and study and extracts (or indeed, the full report) may be included in professional journals provided that suitable acknowledgement is made and the reproduction is not associated with any form of advertising. Applications for commercial reproduction should be addressed to: NIHR Journals Library, National Institute for Health Research, Evaluation, Trials and Studies Coordinating Centre, Alpha House, University of Southampton Science Park, Southampton SO16 7NS, UK.

Published by the NIHR Journals Library ([www.journalslibrary.nihr.ac.uk](http://www.journalslibrary.nihr.ac.uk)), produced by Prepress Projects Ltd, Perth, Scotland ([www.prepress-projects.co.uk](http://www.prepress-projects.co.uk)).

## NIHR Journals Library Editor-in-Chief

---

**Professor Ken Stein** Professor of Public Health, University of Exeter Medical School, UK

## NIHR Journals Library Editors

---

**Professor John Powell** Chair of HTA and EME Editorial Board and Editor-in-Chief of HTA and EME journals. Consultant Clinical Adviser, National Institute for Health and Care Excellence (NICE), UK, and Professor of Digital Health Care, Nuffield Department of Primary Care Health Sciences, University of Oxford, UK

**Professor Andrée Le May** Chair of NIHR Journals Library Editorial Group (HS&DR, PGfAR, PHR journals) and Editor-in-Chief of HS&DR, PGfAR, PHR journals

**Professor Matthias Beck** Professor of Management, Cork University Business School, Department of Management and Marketing, University College Cork, Ireland

**Dr Tessa Crilly** Director, Crystal Blue Consulting Ltd, UK

**Dr Eugenia Cronin** Senior Scientific Advisor, Wessex Institute, UK

**Dr Peter Davidson** Consultant Advisor, Wessex Institute, University of Southampton, UK

**Ms Tara Lamont** Senior Scientific Adviser (Evidence Use), Wessex Institute, University of Southampton, UK

**Dr Catriona McDaid** Senior Research Fellow, York Trials Unit, Department of Health Sciences, University of York, UK

**Professor William McGuire** Professor of Child Health, Hull York Medical School, University of York, UK

**Professor Geoffrey Meads** Emeritus Professor of Wellbeing Research, University of Winchester, UK

**Professor James Raftery** Professor of Health Technology Assessment, Wessex Institute, Faculty of Medicine, University of Southampton, UK

**Dr Rob Riemsma** Reviews Manager, Kleijnen Systematic Reviews Ltd, UK

**Professor Helen Roberts** Professor of Child Health Research, UCL Great Ormond Street Institute of Child Health, UK

**Professor Jonathan Ross** Professor of Sexual Health and HIV, University Hospital Birmingham, UK

**Professor Helen Snooks** Professor of Health Services Research, Institute of Life Science, College of Medicine, Swansea University, UK

**Professor Ken Stein** Professor of Public Health, University of Exeter Medical School, UK

**Professor Jim Thornton** Professor of Obstetrics and Gynaecology, Faculty of Medicine and Health Sciences, University of Nottingham, UK

Please visit the website for a list of editors: [www.journalslibrary.nihr.ac.uk/about/editors](http://www.journalslibrary.nihr.ac.uk/about/editors)

**Editorial contact:** [journals.library@nihr.ac.uk](mailto:journals.library@nihr.ac.uk)