Scottish (Managed) Sustainable Health Network (SMaSH)

Report

The similarities and differences between Health Behaviour Change and Sustainability Behaviour Change: A systematic literature review

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Preface

We live in what geologist call the Holocene. The term can be best translated as meaning the “entirely recent” in geologic time. It has been characterised as the time after the last of the glacial period until now, so roughly 12,000 years. However, many geologists and other scientists have debated whether or not we have moved into what they call the Anthropocene – that time when the activities of human beings has begun to outstrip the geological processes and characteristics that mark earlier epochs. In other words, the epoch in which humanity started to mould our planet’s geology and atmospheric processes by our actions, rather than be moulded by them.

Whether or not we are in a new geological epoch, the evidence that human behaviour – whether as individuals or from within organisations – is a major component in our over-reliance on carbon based fuels to create and maintain life and to power our everyday world is clear. The corollary of which is that sustainable development – our capacity to continue to use limited resource now and for our future – will also be based – in part - on how well we mitigate and adapt human behaviours to become more sustainable.

Some years ago, the Scottish Managed Sustainable Health Network (SMaSH) was asked to help colleagues working in the sustainable development field by seeing what our understanding of health behaviour change could be translated into how we could influence and change sustainability behaviours. This systematic review of the similarities and differences between the two type of behaviour and behaviour change approaches applied, is an initial step in trying to answer that question.

I am indebted to Elizabeth Oldcorn of NHS Lothian, the report’s lead author, and to Julie Arnott, who provided Knowledge Services expertise, for undertaking this work. I also wish to acknowledge the vital contribution of the ScotPHN team which provided the project management and the secretariat for the work. Together they have provided an essential starting point for anyone wishing to understand how to change behaviour to promote individual and organisational sustainability and achieve the necessary health co-benefits

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1 Summary

Objective. To investigate the differences and similarities between attempts to change health behaviours compared with sustainability behaviours.

Design. Systematic literature review.

Method. Two searches of the literature were conducted into (a) health behaviour change and (b) sustainability behaviour change. Papers published since (a) 2010 and (b) 2005 respectively, in English, worldwide were included. Databases searched were Applied Social Science Index and Abstracts (ASSIA), Cochrane and Science Direct, PsychINFO and Proquest Public Health. Google Advanced and Google Scholar were used to search the grey literature. Studies were included that assessed the impact of measures to bring about behaviour change.

Results. Twenty-five studies were selected for final review. Sixteen from the health behaviour change (HBC) search and nine from the sustainability behaviour change (SBC) search. Studies looking at HBC were more likely to have a randomised controlled trial design, particularly those concerning physical activity, weight control/loss. The Theory of Planned Behaviour (TPB) was the model most often applied to both health and pro-environmental behaviours, with some support demonstrated for the construct of perceived behavioural control being important for both areas of behaviour change. Constructs from other models identified as important included intrinsic motivation, values, habits and social factors. Tools and approaches shown to have some value included planning, personalised feedback, incentives and information provision.

Conclusions. Similarities between the underlying processes that bring about behaviour change between health and sustainability behaviours was demonstrated. In particular, perceived behavioural control, self-efficacy, social norms and supports. The review was not able to conclude that the same measures to affect these constructs for HBC can be replicated for SBC. Further studies comparing specific constructs and/or behaviours could be useful in determining the transferability of effective interventions. Further research across both areas would benefit from more randomised controlled trials, the use of objective measures of behaviours and follow up. Consideration in the literature of the efficacy of different interventions in terms of inequalities would also be welcomed. One of the key findings is the need for more studies looking at actual change, rather than predicting behaviour or measuring associations between variables and behaviours for both SBC and HBC.

2 Background

Supporting, assisting, helping, persuading people to change behaviour, whether in relation to health behaviour or behaviours intended to reduce further environmental damage or mitigate the impact of climate change, is a major challenge; for not just health professionals but governments, local authorities, voluntary and private sectors. Just as promoting health and the reduction of health inequalities is everyone's business[1], so is promoting environmentally friendly behaviours and reducing damage to the environment, not least as this is a major determinant of health and health inequalities. Key recommendation six of Fair Society, Healthy Lives stated: *"Tackling social inequalities in health and tackling climate change must go together."*[2]

There are numerous strategies and action plans in Scotland aimed at promoting positive health behaviours and reducing further damage to the environment. The areas where these seemingly most closely overlap are in relation to active travel and food. However the health impacts of climate change, and the environmental impact of poor health, mean that the whole of these agendas are inextricably linked.

Behaviour change needs to take place at both individual level and at the level of organisations. Organisational behaviour change requires change in the procedures, protocols, infrastructure and culture of an organisation and individual behaviour change in the organisational context needs to take place for this to happen. Staff at all levels have to behave differently to bring about changes at an organisational level.

Health Behaviour Change (HBC) has received a huge amount of attention in recent years due to the importance role that health behaviours, such as diet, physical activity and exercise, smoking and alcohol consumption, play in determining the health status of individuals. People in Scotland are living longer but the number of people living with long-term conditions is rising.[3]

The Scottish Health Survey 2014[4] shows that people in Scotland are still not consuming the recommended levels of fruit and vegetables and are exceeding recommended limits of fat, salt and alcohol. Smoking is still most prevalent in the most deprived communities. Almost two-thirds of adults were overweight or obese with only 63% of adults engaging in the recommended minimum levels of physical activity each week. It is estimated that nearly a quarter of all deaths could be avoided if people engaged in healthier lifestyles[5]. There can often be a tension between focusing on individual factors to bring about lifestyle change, and looking at external determinants, the socioeconomic, cultural and environmental influences.

The term 'Health Behaviour Change' refers to an approach, consisting of a set of tools and techniques aimed at bringing about a change in people's health behaviours. HBC encompasses a wide variety of strategies and tools such as

motivational interviewing, goal setting, planning, use of incentives, self-monitoring, feedback and review.[6]

Sustainability behaviour change (SBC) refers to behaviours that are 'pro-environmental'. Pro-environmental behaviour (PEB) consists of actions consciously performed by an individual to lessen the negative impact of human activities on the environment and/or to enhance the quality of the environment. This encompasses the 'private-sphere environmentalism' type of 'environmentally significant behaviour' as described by Stern.[7] Sustainability behaviour change therefore concerns attempting to influence, persuade or support people, whether as individuals or as part of organisations, to engage in or increase pro-environmental behaviours.

The Climate Change (Scotland) Act 2009 requires a reduction in Scotland's greenhouse gas emissions by at least 80% by 2050[8]. Energy use, for example via transport, the home sector and the agricultural sector[9], waste such as food waste and landfill, increased resource use and consumer habits all contribute to the production of greenhouse gases. Pro-environmental behaviours include those aimed at waste reduction such as recycling and food waste, reduction of energy consumption including household heating, lighting, insulation, car/petrol use, active travel, and consumer behaviours such as purchasing greener products, locally sourced food and energy efficient appliances. Organisational pro-environmental behaviours could be developing or adhering to environmental policies and guidelines, and considering the environmental impact of practices. For example, the NHS Scotland Sustainable Development Strategy[10] includes travel, procurement, facilities management, workforce, community engagement and buildings. Stern noted that the influences on private-sphere actions are likely to be different from the influences on environmental behaviour in an organisational context.[7]

It almost goes without saying that people's behaviour is influenced by a vast number of factors. Numerous models have attempted, with varying degrees of success, to make sense of the factors and causal chains that lead to behaviour. For example Ajzen's Theory of Planned Behaviour[11], Social Learning Theory[12], Self-determination theory[13], Disconnected Values Model (DVM)[14], consideration of future consequences[15], Self-affirmation theory[16], and the Stages of Change or 'Transtheoretical model'[17] to name just a few. Some have been developed specifically concerning health behaviours e.g. Health Belief Model[18] and, to a lesser extent, to pro-environmental behaviour e.g. Value-Belief-Norm theory[19].

Theoretical models provide understanding of the factors and mechanisms through which behaviour is influenced, and therefore provide a basis by which to explore what works to change behaviour in given circumstances. This understanding informs the planning of policies and interventions aimed at behaviour change. A brief outline of the main theories drawn on in the literature included in this review is given below. For more comprehensive outlines see Darnton's Practical Guide[20], the British Psychological Society[21] and Forestry Commission reviews[22].

The Theory of Planned Behaviour (TPB) is one of the psychological theories most often applied in attempts to determine the causal pathways to behaviour and subsequently behaviour change. The TPB explains behaviour as following on from intention, which in turn is determined by an individual's attitudes, subjective norms and perceived behavioural control. In response to the limitations of the TPB in its focus on intentions and the step, or leap, from intention to actual behaviour, the 'extended' TPB, incorporated the construct 'perceived behavioural control' (PBC). PCB reportedly increases the predictive power of the model for behaviour over and above the effects of intentions. Another potential limitation of the TPB is that behaviour is seen as the result of deliberate thought processes. For example, the role of habits on behaviour is not considered.

The Transtheoretical model is frequently used to facilitate understanding of behaviour change as a staged process, including pre-contemplation, contemplation, preparation, action and maintenance. It has been applied to addictive behaviours and health behaviours such as physical activity. Different behaviour change tools and approaches, such as planning and reflection, are considered more or less appropriate at different stages.

Self-determination theory (SDT) focuses on motivation, goal pursuit, attainment and maintenance over time. Self-determination theory postulates that human motivation varies in the extent to which it is autonomous (self-determined) or controlled. Promoting internal behaviour change depends on shifting behaviours arising due to external motivators to arising from internal, or intrinsic, motivation, and understanding the internalisation process by which this occurs.

The Disconnected Values Model (DVM) recognises that habits and behaviours are strongly embedded in our daily routines, and that changing behaviours, for example, increasing physical activity levels is difficult because of many perceived and actual barriers that reduce motivation. In many cases there is a need to overcome long held negative feelings and unpleasant exercise experiences. The DVM works on the assumption that if we can identify unacceptable inconsistencies between our values and habits, this can increase motivation to change healthy behaviours.

Stern grouped determinants of environmentally significant behaviours as either attitudinal, personal capabilities, contextual factors, and habits and routines. He proposed the Values-Beliefs-Norms model in relation to pro-environmental behaviours. For example, people who have more pro-social attitudes are more likely to engage in pro-environmental behaviour, but habits and routines are also important.

In recent years, there have been numerous reviews of behaviour change theory and practice for both health and sustainability behaviour change as already referenced. Some of these have informed Government policy and/or the development of

frameworks[23] [24] [25]and guides[26] [27]or taxonomies of behaviour change techniques, tools and approaches. [28] [29]

The Cabinet Office's Behavioural Insights Team developed the MINDSPACE framework to inform policy relating to health, and following on from this the simplified EAST (easy, attractive, social, timely) framework, applicable across policy areas[30]. Defras 4 E's model (enable, encourage, engagement, exemplify) was developed to guide any policy making aimed at encouraging behaviours[31]. More recently, the Scottish Government commissioned International Review of Behaviour Change Initiatives (2011) [32] gave rise to the ISM tool[33]. Primarily relating to pro-environmental behaviour relating to reducing carbon consumption, this classifies the focus for behaviour change initiatives into those that focus on 'individual' factors for example, attitudes, values, beliefs, emotions and habits, those that address 'social' norms and cultural conventions, and those considered 'material' i.e. technology, infrastructures and objects that are facilitators and barriers to behaviours. Low Carbon Scotland a Behaviours Framework (2013)[34] drew on the ISM model in relation to encouraging ten key sustainability behaviours. This framework highlighted the importance of intrinsic values to sustainable behaviours, and recognised the role of organisations as well as individuals in achieving this change.

A significant challenge in the application of models to interventions, policies and action plans for behaviour change is that models attempt to identify and validate the relative importance of a variable or number of variables, and the relationship between them, in influencing behaviour. There is often an assumption that if an empirically supported factor in determining behaviour, such as attitudes or beliefs, is targeted in an intervention, this will result in a change from one behaviour to another. There can also be an assumption that it is the same set of constructs that predict, if not all, then the majority of behaviours. Interventions that are based on models, which are reductionist in nature, often fail to take into account the multiple variables that lie out with the parameters of the model. As already noted, behaviour is complex, influences on behaviour are many, and the mechanisms behind behaviour change varied. There are also different types of behaviour change, from trying to encourage new behaviours, the cessation of former behaviours, and the modification or adaption of current behaviours. In the health arena, there is also the impact of physical addiction and dependence to consider.

The Scottish Government's Impact of Workplace Initiatives on Low Carbon Scotland[35] and Low Carbon Scotland: A Behaviours Framework, highlight the role organisations have in contributing to climate change and therefore the importance of corporations integrating prevention of further harm to the environment and mitigation of the impact of climate change into their daily practices. There are a number of benefits to organisations in engaging with this agenda: more efficient practices, reduction in resource consumption, improved health and wellbeing of employees and potentially customers/clients, improved image and reputation amongst target audiences/ customer and shareholders. There are also a number of barriers to

organisations to engaging with more pro-environmental ways of working: increased initial costs e.g. installation of energy efficient appliances and lack of interest and engagement from some staff, customers and shareholders.

The two aforementioned documents drew on the ISM approach to classifying influences/contexts on behaviour change in recognition of the need to have action at all levels to bring about the most effective and lasting behaviour change. The impact of workplace initiatives report provides a comprehensive review of ten initiatives aimed at cutting carbon emissions and includes best practice guidance to employers. A 'whole organisation approach' working at all three of the ISM levels, based around staff engagement, is recommended as having the most impact on carbon reduction.

The Scottish Managed Sustainable Health Network (SMaSH) sought to understand whether the principles and approaches applied to changing health behaviour were transferable to sustainability behaviour change and vice versa. This systematic review of the literature attempts to identify the differences and similarities in the literature on health behaviour change and sustainability behaviour change. The grey literature on both areas has also been considered. Some conclusions are drawn and recommendations for future interventions and research proposed.

3 Method

3.1 Search strategy and data sources

This review started in February 2016 and followed the PRISMA standard for systematic literature reviews[36]. The search was divided into two areas of behaviour change: sustainability behaviour change and health behaviour change. Both searches covered peer-reviewed articles and the grey literature. Both peer-reviewed searches included articles published in English but carried out worldwide. Searches were conducted of the following databases: ASSIA, Cochrane and Science Direct, PsychINFO and Proquest Public Health. Searches of the grey literature were conducted on both SBC and HBC separately using Google Advanced and Google Scholar (respectively).

The sustainability behaviour change search initially was for papers published since 2000. Search terms for sustainability behaviour change included climate change, low carbon behaviours, sustainable behaviour change, going green, greenhouse effect, environmentally friendly, responsible, awareness, environmental policy, emissions, environmental justice, conservation of natural resources, working to reduce climate change. Due to the volume of articles this search returned, the date was brought forward to 2005 and the following exclusion criteria was applied: papers that focus on the physical sciences/ environmental sciences/marine biological sciences; those that focus on changing the physical environment of

buildings/infrastructure/roads and those where the main focus is on medical topics and treatments for conditions e.g. diabetes, arthritis, asthma. The SBC search of the grey literature used the terms 'behaviour change' and 'sustainability'.

In 2010, NHS Health Scotland published a comprehensive Health Behaviour Change competency framework, which was based on a review of the literature and the NICE guidelines (both already referenced). Therefore the HBC search included studies published after 2010, published worldwide, in English. The search terms applied included health behaviour change, motivational interviewing, influence, individual, organisational, social, structural, adopting behaviour, nudge or shove, new behaviour. The grey literature search used the terms 'behaviour change' and health.

3.2 Inclusion/Exclusion criteria

After the identification of titles following the search strategy outlined above, the following inclusion exclusion criteria was applied to abstracts and then full-text articles for both searches. Empirical studies using primary data of an intervention intended to bring about a change in behaviour of individuals, populations or organisations were included. A distinction was made between papers that investigated the relationship between variables and sustainability or health behaviour and those that looked at actual changes in behaviour. Papers that applied a framework or model of behaviour e.g. Theory of Planned Behaviour in relation to change, were included. Papers were excluded that focused on recovery, specified illnesses, scientific contexts e.g. marine biology or that used the term 'environmental' to mean any external influencing factor.

3.3 Data synthesis

The studies were grouped into themes according to area of behaviour or setting, and are shown in table 1.

Table 1. Behavioural outcomes, settings

Area and Theme	Number of papers
SBC	
Active travel	1 (Bamberg)[37]
Green consumption/purchasing	3 (Ohtomo & Ohnuma[38]; Bodur *et al*[39]; Biel & Grankvist[40])
Recycling	3 (Timlett & Williams[41]; Bernstad *et al*[42]; Dai *et al*[43])
Schools/education	2 (Schelly *et al*[44], Research Centre for Children, Schools and Families (RCCSF)[45])
HBC	
Alcohol	1 (Armitage[46])
Fruit consumption	2 (van Osch *et al*[47]; de Bruijn *et al*[48])
Mental wellbeing & fitness	1 (Anshel *et al*[49])
Organisational change for HBC	1 (Neuner-Jehle *et al*)[50]

Physical activity (PA)	2 (Mouton & Cloes[51]; Darker *et al*[52])
Weight loss/control programmes (incorporating PA)	7 (Gorin *et al*[53]; Carels *et al*[54]; Jennings *et al*[55]; Kuznetsov *et al*[56]; Wasserkampf *et al*[57]; Mata *et al*[58]; Silva *et al*[59])
Smoking	1 (Middlestadt *et al*[60])
Sunscreen use	1 (Craciun *et al*[61])

Subsequent to this initial classification, cross-cutting themes were then identified in order to identify differences and similarities between the studies concerned with SBC compared to HBC. The following categories were identified and are presented: study design and methods; theories and constructs, the intention-behaviour gap, internal versus external influences, tools and techniques for behaviour change, organisational change.

3.4 Results

Twenty-four papers from the searches of peer reviewed papers met the review criteria. Eight papers included concerned SBC and sixteen HBC. Studies were excluded from the final review due to reasons such as focus on describing prevalence of constructs or behaviours, identifying correlations between variables and behaviour, reporting surveys or data analysis where no intervention or attempts at behaviour change had taken place. Although the exclusion criteria precluded studies concerning treatment of a diagnosable illness, one exception was made. Kuznetsov *et al*'s study concerned with weight management of individuals with newly diagnosed type 2 diabetes was included, as the intervention could equally be applied to those who were overweight or obese without a diagnosis.

One paper from the grey literature search on SBC was included, which was an evaluation of a study on children as agents of environmental change[62]. A further ten papers from the grey literature, either reviews, frameworks or guides, are referenced in the introduction. Table 2 provides the numbers of titles returned at each stage of each search.

Table 2 Search summary

	Search Stage					
Search topic/literature type	Initial search results	Duplicates removed	Titles screened	Abstracts screened	Full-text articles reviewed	Final no for inclusion
SBC						
Peer-reviewed	1012	41	583	114	46	8
Grey	61	4	57	-	17	1
HBC						
Peer-reviewed	397	151	246	246	36	16
Grey	50	1	49	-	13	0

The large number of abstracts that were screened and full text articles that were reviewed before the final selection was made, was due to the reference in either the title or abstract to the determinants of behaviour or a behavioural outcome. Many of these papers discussed the implications for behaviour change, even though the focus of the intervention or study was not change but merely the presence or existence of certain construct(s) or behaviour in relation to other factors. These papers were excluded from the final review.

4 Study design and methods

Twelve of the studies were randomised controlled trials, two from the SBC search and ten from the HBC search. There were three longitudinal studies from the HBC search. Two SBC studies used a simulated situation and there was one case study on energy reduction in a school setting.

The measures used in eight of the SBC studies and thirteen from the HBC studies relied on self-report, which can be open to report bias, but generally the authors had taken reasonable steps to minimise this and had recognised this limitation. Eleven used objective measures of outcomes (five SBC and six HBC), such as weight of recycled waste, pedometers for walking or individual weight. Eight of these studies combined data gathered using an objective method with a self-report method such as questionnaire, inventory or checklist. Some (n=3) used other qualitative approaches, such as focus groups and semi structured interviews in combination with questionnaires.

Overall the studies looking at HBC were more likely to have a randomised controlled trial design, particularly those concerning physical activity or weight control/loss. The use of questionnaires as a method for data collection was prevalent across both areas of research, which brings with it risks of bias. A number of studies across both research areas used objective measures of behaviour for example personal weight (Gorin *et al*, Carels *et al*), weight and other physical checks such as blood pressure (Jennings *et al*), physical activity measures (Kuznetsov *et al*, Darker *et al*); fitness tests (Anshel), weight and volume of household recycling (Timlett and Williams, Bernstad *et al*, Dai *et al*), energy consumption (Schelly *et al*) and plastic bag usage (Ohtomo and Ohnuma). All but two of these used measures alongside self-report methods such as a questionnaires and inventories, semi-structured interviews and focus groups. This leaves thirteen studies, four from the SBC search and nine from the HBC search that relied exclusively on self-report to assess behaviour.

The data extraction tables for included studies are available on the ScotPHN website.

5 Theories and constructs

The Theory of Planned Behaviour (TPB) was the model most often applied to both health behaviours (de Bruijn *et al*, Darker *et al*, Middlestadt *et al*, Wasserkampf *et al*); and pro-environmental behaviours (Bamberg, Ohtomo & Ohnuma, RCCSF). The Transtheoretical model was used as the basis for two of the studies looking at HBC (Mouton & Cloes, Craciun *et al*), but none of the SBC papers. Self-determination theory was drawn on exclusively by two authors (Silva *et al*, Mata *et al*) in relation to HBC and in combination with the TPB (Wasserkampf *et al*) but for none of the SBC papers. Principles recommended in the NICE guidelines formed the basis of one of the HBC studies (Jennings *et al*). Other models drawn on for HBC were the Disconnected Values Model (DVM) for mental wellbeing and fitness (Anshel), Steele's Self Affirmation Theory for alcohol consumption (Armitage *et al*), Reflective Impulsive Model for weight loss/control (Carels *et al*). One paper was based on a socioecological model for weight loss/control (Gorin *et al*). In relation to SBC, other than the TPB and the Values-Beliefs-Norms model, two papers drew on Defra's 4 E's (Dai *et al*, Timlett & Williams).

Of the papers that used the TPB as a framework, the RCCSF study into whether the implementation of an environmental educational programme resulted in changes in the pro-environmental behaviours (energy consumption) of parents, concluded that the TPB constructs of intentions and attitudes do effect behaviour change, despite a small sample size. De Bruijn *et al* found PCB and attitudes (cognitive and affective) to be important for behaviour change. Darker *et al* found that interventions to increase PBC were related to increases in walking.

Wasserkampf *et al* compared constructs from the TPB and Self-determination theory (SDT) in a randomised controlled trail in relation to physical activity in the context of weight management programmes for women. They found that SDT was more relevant to actual behaviour than the TPB, with its focus on action or goal pursuit, rather than intention. They also noted a difference in applicability between the models depending on the type of physical activity. The TPB constructs of perception of self-efficacy and control, or competence, were more relevant to moderate & vigorous physical activity and the early adoption of behaviours. SDT constructs, such as intrinsic motivation, regulation, autonomy and affect, were more useful for understanding the undertaking of lifestyle physical activity and maintenance of both kinds of physical activity.

The role of motivation was often discussed in relation to determining behaviour change for both health behaviours and sustainability behaviours (e.g. self-determination theory). Motivation is this context refers to the processes and feelings which cause people to act. Silva *et al* and Mata *et al* focused on increasing internal, or intrinsic, motivation (when a behaviour is performed due to the rewards or enjoyment of the behaviour itself) in application to the increase of physical activity for weight control. In a randomised controlled trail that focused on promoting intrinsic motivation and autonomous forms of exercise, Silva *et al* found at one year the intervention group showed increased weight loss and physical activity levels. They concluded that supportive environments are required for moving from external (engaging in a behaviour due to external factors such as incentives, praise, recognition) to intrinsic motivation in the context of weight loss. For example, a health care climate being seen as supportive, promoting autonomy, rather than controlling, including treatment self-regulation.

Mata *et al* also investigated the transferability of motivation from one area of health behaviour to another, in a randomised controlled trial looking at whether exercise specific motivation transfers to regulation of eating. A weight loss programme that focused on promoting physical activity and internal motivation for exercise and weight loss in women, found increased general self-determination and intrinsic exercise motivation did lead to improvements in eating self-regulation. This transferability was attributed to the physiological and psychological effects of exercise such as appetite regulation and improved self-efficacy. This study highlights the need to establish what the mechanisms are that lead to the target behaviour change to enable judgments about the transferability and applicability of interventions to other kinds of behaviour change.

Other researchers (Prochaska & Di Climente, Schwarzer *et al* in Craciun *et al*) consider motivation to be a staged process. Craciun *et al* extended the Trans-Theoretical Model to draw on the Health Action Process Approach (HAPA) which considers there to be two stages, motivational, when intentions are developed, and volitional, when intentions are acted upon. In a randomised controlled trail on promoting sunscreen use amongst women, strategies to promote the volitional stage such as self-efficacy and self-regulatory skills were more effective than strategies to increase motivation, such as risk perception. Coping planning in particular (as oppose to action planning) was indicated as playing a key role in bridging the intention behaviour gap.

Anshel used the Disconnected Values Model (DVM) to increase employee physical fitness and mental wellbeing. A ten week fitness programme for employees that resulted in increases in physical fitness and mental wellbeing supporting the premise that promoting awareness of the ‘disconnect’ between people’s values and their behaviour can lead to behaviour change. Bodur *et al* also explored the importance of values such as self-construal (the way people view themselves in relation to others) and social responsibility in relation to green purchasing behaviour to explore

the ‘values-behaviour’ gap. This found that ‘prediction requests’ (e.g. asking people to commit themselves to an action) are more effective in promoting purchase of environmentally friendly products in people whose self-view is more interdependent on others.

Armitage, drawing on Self-affirmation theory, recognised a barrier to behaviour change in the processes that come into play (e.g. feeling anxious or threatened) when exposed to a health threatening message, and successfully used self-affirming interventions to reduce this barrier and consequently adolescent alcohol consumption.

6 The intention–behaviour gap

Some papers included in the review discussed ways to narrow the intention-behaviour gap for health-related behaviours. In a randomised controlled trail, Darker *et al* found that increased PBC, attitudes and intentions to walk increased actual distance walked per day, with PCB having the main effect, with the increases being maintained at six weeks. Successful strategies employed including goal setting, action planning and coping planning, which impacted on individuals’ sense of control over their walking.

Planning was also found to be effective in bringing about changes in fruit consumption, with preparatory actions (planning a series of actions) more influential to behaviour change than implementational planning (where, when, how), when focusing on goals (Van Osch *et al*). The need for sequences of preparatory actions and strategies was discussed. As discussed above, Craciun *et al* identified coping planning as important in bridging the intention-behaviour gap for use of sunscreen.

The papers in the review focusing on SBC did not consider the intention-behaviour gap as fully as those looking at HBC. As noted above, one paper looking at recycling (Bodur) considered the ‘values (relating to the environment) – behaviour gap’ in that occurs with PEBs, and found social norms and beliefs to be important factors.

7 Internal vs External influences

Although most of the studies included in the review focused on internal, individual processes, some examined the role of external factors whether social or structural. As well as those already noted above in relation to social norms, in a randomised controlled trial based on social ecological models, Gorin *et al* found that

modifications to the physical and social home environment combined with behavioural approaches were more effective in effecting weight loss in adults at six months, but not at eighteen months follow up, than just the behavioural weight loss approach alone. A gender difference was also observed. Mouton and Cloes found that a physical activity intervention that combined social support/interaction with a web-based tool, yielded the best results. Bernstad *et al* also demonstrated the need for multi-layered strategies from individual to structural, in relation to recycling.

The importance of the modifications to the environment to the disruption of habits regarding food consumption was not supported by findings by Carels *et al*. They hypothesised that modifying and creating environments that disrupt unhealthy and cue healthy behaviours is important, and that healthy habits need to be formed for behaviour change to be sustained. However they found no difference between weight loss approaches that included environmental modifications, although they suggested that the environmental modification approach may appeal to some people over more traditional weight loss approaches.

Middlestadt *et al* (2012) drew on the TPB when examining the effects of a variety of tobacco control measures, with the assumption that intention to quit is a pre-requisite to stopping smoking. Interventions such as educational programmes to change beliefs and intentions, need to operate hand in hand with measures to influence the environmental context, such as legislation. This longitudinal study demonstrates the need for multifactorial approaches, addressing individual factors in the context of external determinants, when influencing long term behaviour change at pop level. Bernstad *et al* demonstrated the multi-layered interventions are required to promote the widespread, and seemingly relatively simple, PEB of recycling.

The success of interventions to create the conditions conducive to acting on intentions and changing habits via influencing situation specific beliefs, influencing perceived behavioural control, was illustrated by Bamberg in relation to active travel. A time of transition, moving house, was identified as an opportunity to intervene to change people's behavioural habits from commuting to using public transport. However the intention had to be present prior to the time of transition and intervention for the changes to be maintained post-intervention. It was noted that individual factors may have been the precursor to the time of change i.e. a desire to increase likelihood of acting on intentions by the individual may have instigated the house move. Although the focus of the study was to reduce the environmental impact of car use, the underpinning values or motivations as to why people changed their commuting behaviour e.g. for environmental or health reasons were not outlined/explored.

Biel & Grankvist found that whilst professional purchasers were influenced by price when choosing greener products, providing information on the environmental impacts of products can affect preferences. The importance of the way and type of information provided for both HBC and SBC is discussed below.

8 Tools and techniques for behaviour change

Some researchers focus on the specific tools and techniques, that may, or may not, bring about changes in behaviour. This review only included studies of this type if the casual processes assumed to be at play were outlined in the paper even if they were not being specifically measured.

In relation to HBC, specific behaviour change techniques examined by papers in this review were planning (as already discussed), information provision and environmental cueing. For SBC, studies looked at commitment based strategies/prediction requests, goal framing, information provision, as well as clusters of determinants.

Information: The relative importance of information, or more specifically, how it is framed and presented, was considered by two of the HBC studies. As already discussed, Armitage investigated the impact of exposure to health threatening messages as a being a barrier to behaviour change and positive messages to overcome this. Middlestadt *et al* found the most effective campaigns for stopping smoking were combined educational strategies (to change beliefs, intentions) and modifying environmental factors with policy based interventions.

Five SBC focused studies included looked at the role of information in a number of different ways. Biel and Grankvist, using a web-based intervention, found that the more comprehensive information provided about a product's environmental impact corresponded with preference for environmentally friendly products amongst professional purchasers. Negative messages (those focusing on harm of the behaviour) had more of an impact than the positive. However the measure was expressed preference in a simulated situation rather than real-life buying behaviour. Bernstad found no difference in the impact of written compared with written plus oral information on the recycling of household food waste. Timlett and Williams found personalised feedback to be effective in increasing levels of recycling. Bamberg also found personalised feedback as oppose to generalised information effective in increasing active travel at a time of transition.

In a randomised controlled trial looking at the use of prediction requests, or asking people to make a commitment, Bodur *et al* found that an advert with a prediction request increased consumers' choices for environmentally friendly product and that the presence of an audience cue (giving the impression, real or otherwise, the person is being observed) made the effect even greater. This effect was greatest amongst those who were more likely to be influenced by social norms. However, the situation in this study was a computer-based simulation. Three studies looked at specific tools to encourage recycling. 'Door stepping', a technique involving door to

door contact with households has been shown to be effective, at least in the short term. Bernstad *et al* compared providing written versus oral plus written information, via door stepping about recycling and found no statistical difference. There were increases in recycling in both conditions but neither of these were sustained. What was important was physical changes and accessibility, such as recycling schemes, and the convenience within the house of recycling. Dai *et al* examined why door stepping can be effective in increasing household waste recycling and found that social norms, emotion, and to a lesser extent, prompts were important to behaviour change. However, knowledge, skills, beliefs of consequences and capability, feedback, motivation and action planning were not. Therefore concluding it is not the door stepping in itself that is effective but the focus of the particular door stepping campaign and the psychological processes it influences or triggers.

One study directly compared the efficacy of behaviour change tools to encourage participation in recycling and certain aspects of recycling behaviour, and found it is often simple, point of delivery interventions that prove to be the most effective (Timlett and Williams). Based on Defra's 4 Es framework, incentives and personalised feedback were found to be the most effective at reducing contamination of recycled waste, with feedback being the most cost-effective method, over door stepping. Previous findings that incentives work to arouse interest and awareness but that this interest is not sustained are supported here. Once again, the wording of the feedback (personalised) was found to be important, and how or when it is delivered (point of service).

Incentives: Similar to Timlett and Williams findings on incentives (plus personalised feedback) being effective for increasing engagement with recycling schemes, Bamberg found that behaviour change was not sustained when financial incentives used to increase active travel, although they did bring about an immediate change or adoption of behaviours.

Social influences: Mouton and Cloes compared web based, centre-based and combined interventions for physical activity among older adults, in a randomised control trail drawing on stages of change for physical activity and the self-determination theory. They found the combined intervention containing social and motivating factors resulted in increased participants physical activity levels at twelve months follow up. The web only based intervention increased awareness but did not bring about change thus demonstrating the importance of social support for bringing about and sustaining physical activity behaviour change, in this case with older people, most likely due to impacting on autonomous motivation. Limitations of this study included a self-selection/drop out bias and use of self-report measures.

Whether it is personalised feedback, door stepping or the presence of a health trainer, there is some evidence that the personal approach is effective in bringing about changes in behaviour and maintaining those changes. Jennings *et al* examined techniques such as motivational interviewing, specific goal setting, self-

monitoring, feedback and goal review, designed to enhance motivation and self-efficacy in a weight management programme using a health trainer in an area of deprivation. Moderate weight loss was achieved in a deprived area. However, there was no follow up if participants so it is not known whether the changes were maintained.

9 Organisational change

Only two studies were included for review which looked at organisational change. One for PEB in a school setting and one for a health setting adopting HBC practices. However, the comprehensive Impact of Workplace Initiatives on Low Carbon Scotland, which includes ten case studies, can be referred to for an overview of the evidence.

In a longitudinal comparison of two schools, where one achieved considerable reduction in its energy consumption compared to another, Schelly *et al* looked at individual versus organisational measures. They found that the most impact was achieved when measures take place at every level in a coordinated, joined up approach – from education authority to students. An organisational cultural that focuses on pro-environmentalism and includes coordinated structural changes and individual behaviour change is crucial. A key driver behind the initiatives were to reduce costs incurred by the schools associated with energy consumption, as well as environmental concerns. The role of leadership in communicating expectations and outcomes was also discussed.

The role of comparative feedback as a motivator was demonstrated, though this may be of particular relevance to an inter-school situation. This study also noticed that whilst behaviour change was affected by perceived self-efficacy, expectations and organisational culture, there was no reported change in attitudes brought about by structural changes, suggesting that the norms and perceived behavioural control were important.

When testing the feasibility and acceptability of a new patient-centred 'health coaching' approach to be employed by GPs, Neuner-Jehle *et al* found high acceptance for the programme which included training, but recommended for replication, attention to facilitating the integration of the new approach with busy work schedules and workload, as well as appropriate reimbursement (incentives) for delivering sessions.

10 Discussion

This review aimed to identify the differences and similarities between health behaviour change and sustainability behaviour change. There is some evidence to support the view that some of the same internal and external influences are important but that the processes by which these are influenced differ between behaviours.

The area of SBC would benefit from more randomised controlled trials to assess the effectiveness of interventions to promote pro-environmental behaviours. Both areas of research would benefit from the use of more objective measures of actual behaviour. However, it is possible that the inclusion of an objective measure is in itself a motivator to engage in the behaviour, if participants are aware of this e.g. pedometer use. For this reason, amongst others, such as demonstrating value for money, sustainability and long term impacts of interventions, more studies across both areas of work should aim to incorporate follow up measures.

The papers reviewed here support the view that it is important to have a theoretical underpinning of behaviour change, in order to target the correct factors and processes to bring about the desired change in the behaviour in question, and to select the appropriate approaches. Also, that it can be useful to draw on a range of conceptual models to understand the complexity of the variables involved in effecting and maintaining behaviour change. The TPB, particularly the construct of perceived behavioural control, is shown to be useful for both HBC and SBC. The findings here support the view that perceived behavioural control is influential in effecting behaviour change for health and sustainability. There is some evidence that increasing intrinsic motivation is effective in causing behaviour change for some health behaviours, such as physical activity, weight control, and changes to external factors, such as social supports, are important to make this happen and for changes to be maintained. External motivators may bring about some short term changes for both health and sustainable behaviours but these need to become internalised for lasting change. There is no evidence to suggest that motivation, when increased, will transfer from one area of behaviour to another and further studies could explore this for a range of behaviours. However, the findings here suggest that increasing motivation for each type of behaviour, within both health and sustainability, needs to be targeted in its own right.

The literature on SBC considers the role of values more than that on HBC. This discourse on HBC includes attitudes, intentions, motivations, but does not often investigate whether attempts to identify and influence people's underlying values could bring about changes in relation to health behaviour. The paper by Anshel *et al* based on the Values-disconnect model began to explore this relationship, which could be developed further in future studies.

The studies included here applied more of a variety of models to attempts to bring about HBC than SBC. The area of SBC may benefit from exploring the applicability of other models of behaviour and behaviour change to sustainability behaviours.

The papers reviewed here reflect the acceptance in the field that intentions towards a behaviour are a necessary, if not sufficient, precursor to the adoption of that behaviour. The main premise of the TPB is the identification of intention. Whilst there is evidence that intention can lead to behaviour[63], there is much debate in the literature regarding the intention-behaviour gap and the recognition that good

intentions do not always lead to performance of the intended action(s). The findings here support the view that perceived behavioural control is influential in bridging the intention-behaviour gap for behaviour change for health and sustainability but there are also suggestions that other factors may be as influential e.g. intrinsic motivation, and the need to break habits using external motivators provided at the right time. The SBC literature here did not discuss the intention-behaviour gaps explicitly, focusing more on the environmental and social values-behaviour gap.

The importance of considering both internal and external influencing factors is demonstrated for both health and sustainability behaviour change. The literature on SBC tended to focus more on the nature of PEB requiring a more long-term, altruistic, global perspective. The literature on HBC could increase attempts to determine behaviour change by looking at longer-term, external influencing factors, such as values, although regulation and social influences were considered here and found to be important. Findings here suggest that social, home environmental factors are influential to changes to physical activity, weight loss, active travel and green purchasing. The timing of interventions is important to the success for both HBC and SBC.

The papers included here differed in the range of tools and techniques they were examining, between HBC and SBC, although some of the underlying constructs or change processes involved were the same, such as increasing self-efficacy and perceived behavioural control, as discussed above. HBC found planning (action and coping), goal orientated behaviour and self-affirmation messages to be effective, whereas SBC found personalised feedback and interventions that target the environmental factors that help or hinder a specific action to work. None of the SBC studies looked at planning *per se*, which could be an area for further investigation. The utility of personalised feedback for weight management was suggested and could be explored further, particularly in relation to the findings that suggest that social support can be effective. The components of social contact or support that are effective in which situations would benefit from being further defined for both HBC and SBC.

The way information is provided, whether personalised feedback, information about the consequences of a course of action, web-based tools etc. is crucial to the success of attempts to change health and sustainability behaviours. Across both areas, information in whatever format seems to be most effective when combined with other measures such as social contact, social supports, structural measures e.g. legalisation or access to facilities (recycling), or used at a time of change.

As discussed above, incentives that work on external motivation can bring about short term changes for some health and PEBs, but it is suggested that this needs to become internalised for changes to be maintained. How this internalisation process occurs suggests that the role of values, social factors and structural measures are important.

The literature, therefore, demonstrates that there is not a "one size fits all" theoretical framework or approach to bringing about either health behaviour change or sustainable behaviour change. Behaviour change is caused by a range of internal, social and structural influences. Whilst broadly speaking, concepts such as values, attitudes, perceived behavioural control, social and structural influences are important to consider for all behaviour change, what is crucial is identifying the processes at play and subsequently the most appropriate approaches and tools for the specific behaviour or behaviours and target population in question. This emphasises the importance of looking at the different factors that determine behaviour and how they can be influenced to change.

That only two studies concerning change within an organisational setting were included indicates that there is a lack of evidence on what works to bring about behaviour change both for sustainability and health. The grey literature on this area, particularly *The Impact of Workplace Initiatives on Low Carbon Behaviours* and the *Better Business: How to go greener with staff to improve performance* guide both offer good evidence based guidance for organisations but the lack of studies available suggests a need for more investigations into the success of behaviour change initiatives in the workplace, and the identification of important factors and processes. The papers here support the view that whole organisation approaches are crucial, focusing on strong leadership and management, cultural and organisational values, staff capacity and capability, and individual initiatives.

Only one study included in the review discussed inequalities. Jennings *et al* examined the efficacy of a weight management programme based on HBC techniques (e.g. motivational interviewing, specific goal setting, self-monitoring, feedback and goal review, designed to enhance motivation and self-efficacy) using a health trainer approach in an area of deprivation and discussed whether this would replicate to a non-deprived area. Although there was no follow up or control, the main conclusion was that the health trainer component was instrumental in supporting those in deprived areas engage with the programme. Given the high priority this agenda currently has, both in Scotland and other countries, future areas of research could focus on whether different tools, techniques and processes are effective for different sections of the population who may be more vulnerable to inequalities in health outcomes.

There are limitations to this review. The search terms didn't include very specific areas of behaviour change e.g. portion size, washing machine temperature, light bulbs, which may have led to a number of key areas of research not being included e.g. Marteau *et al*[64]. As discussed above, the literature reflects a need to be very explicit of the behaviour targeted for change. Another major limitation was the final number of papers included for review. This was surprising given the volume of titles returned in the first stages of the search. The number of papers that reached the review stage but were then not included, demonstrates the reliance on assumptions of causal processes. Most specifically, the leap from identifying a correlation

between factors and a particular behaviour, and therefore assuming that changing the factors will change the behaviour. This made the number of papers included, due to the inclusion criteria of the paper measuring change rather than predicting it, not being sufficient to enable comparisons on some of the dimensions. This demonstrates an important point for researchers that more studies need to examine the impact of changes in determinants of behaviour, at whatever level, in relation to the behaviour in question.

Whether tools and techniques shown to be effective in application to one area of behaviour, whether concerned with health or sustainability, was not evidenced here, but again, this is likely to be due to the unavailability of sufficient numbers of studies in the review using the same tools to be able to directly compare. Further research into the transferability of measures to change behaviour could select and compare some specific areas of behaviour rather than HBC and SBC as a whole.

11 Conclusions and implications for practice and further research

This literature review demonstrated some similarities between the underlying processes that can bring about behaviour change between health and sustainability behaviours in terms of underlying constructs in particular, perceived behavioural control, self-efficacy, social norms and supports but was not able to conclude that the same measures to affect these constructs for HBC can be replicated for SBC. Further studies comparing specific constructs and/or behaviours could be useful in determining the transferability of effective interventions. The importance of having an understanding of the underlying processes in bringing about change is supported, and of drawing on a range of models, rather than relying on one, due to the multiple factors involved in determining behaviour change. The review supports the view that multi-layered approaches, looking at individual, social, structural and environmental influences are most effective for both HBC and SBC. When looking at individual factors, both conscious thought processes, such as perceived behavioural control, and automatic processes (habit, impulse) to changing patterns of behaviour and habit formation, are found to be important to both areas of behaviour. Critical to sustaining behaviour change is a supportive environment, promoting the internalisation of motivating factors.

Overall, the SBC studies tended to consider the external, environmental factors, such as infrastructures, more than the HBC studies. Research into PEB and SBC also tended to consider the role of values in relation to the environment, which has an external focus, more than HBC considered values relating to health. Efforts to change health behaviours may benefit more from considering external variables including infrastructure, social influences, values towards external factors e.g.

society. In terms of specific approaches, the efficacy of planning for SBC could be explored and the use of personalised feedback for different areas of HBC, as could the role of social contact and support for both areas. Research across both areas, but in particular SBC, would benefit from more randomised controlled trials, and the use of objective measures of behaviours, with follow up, to see if changes in behaviour are maintained. Consideration in the literature of the efficacy of different interventions in terms of inequalities would also be welcomed. One of the key findings from this review is that there needs to be more studies looking at change, and agents of change, rather than predicting it or measuring associations between variables and behaviours for both SBC and HBC.

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