New Zealand GUIDELINES GROUP
Te Rōpū Rarangi Tohutohu
Promoting Effective Health and Disability Services

RapidE: Chronic Care

A systematic review of the literature on health behaviour change for chronic care

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Executive summary

Background

The Ministry of Health noted the need for a clearer understanding of the evidence regarding effective health behaviour change interventions for individuals with chronic conditions. This review therefore identified, appraised and summarised the most effective evidence-based theories and programmes of health behaviour change for individuals with the following chronic diseases:

- diabetes
- chronic obstructive airways disease
- asthma
- stroke
- hypertension.

The review also looked at non-specific (generic) health behaviour change interventions.

Aim

To summarise the available evidence on health behaviour change interventions for people with a pre-specified chronic disease.

Methods

A systematic review of randomised controlled trials published between 2005 and 2011 inclusive was conducted. Eleven electronic databases, including Medline, Embase and the Cochrane Library, were systematically searched for trials reporting on the effectiveness of health behaviour change interventions for people with one of the pre-defined chronic diseases that represented the greatest disease burden to Māori and non-Māori in New Zealand. Selected studies were critically appraised and summarised.

Results

One hundred and nineteen systematic reviews and/or randomised controlled trials were identified.

Interventions based on single or multiple health behaviour change theories

Social Learning Theory was the most widely-used, effective, health behaviour change theory. Some target behaviours were improved in four of the target chronic conditions (diabetes, asthma, hypertension and non–disease specific).

Cognitive Behavioural Theory/Therapy (as reported in COPD and hypertension), Transtheoretical Model (as reported in hypertension and non–disease specific) and Self-regulation (as reported in diabetes and asthma) were also effective health behaviour change theories.

Programmes or models (including adaptations) based on single or multiple behaviour change theories

Motivational Interviewing was most effective at improving some of the target behaviours in four of the target chronic conditions (diabetes, COPD, asthma, hypertension). Motivational Interviewing is based on multiple health behaviour change theories including Social Learning Theory, Transtheoretical Model, Self-regulation and Theory of Reasoned Action. The Stanford Model and the Chronic Care Model (both based on Social Learning Theory) showed mixed results.

Interventions with no evidence of a theoretical framework based on health behaviour change theory

Interventions which reported no theoretical framework were effective at improving some of the target behaviours in diabetes, COPD, asthma and stroke, and for non–disease specific conditions.

Conclusion

Health behaviour change interventions can be effective at improving some of the selected target behaviours. Social Learning Theory was the most widely-used and effective theoretical framework and Motivational Interviewing was the most effective theoretically-based intervention. This systematic review has highlighted that disease-specific information is an essential component of health behaviour change interventions. The review highlighted some evidence that individuals with poorer control of their disease were more likely to gain greater benefit from a health behaviour change intervention. Prioritisation may need to be given to those with higher morbidity for whom greater efficacy may be achieved.

1 Background and introduction

In 2010, as part of work the New Zealand Guidelines Group (NZGG) undertook on behalf of the Ministry of Health (the Ministry) to deliver a rapid evidence-based product in the Chronic Care area, the need for a clearer understanding of the evidence regarding effective health behaviour change interventions for individuals with chronic conditions was identified. This led to the development of a series of questions to be answered by a systematic review by NZGG. The review was to look at the most effective evidence-based theories and programmes of health behaviour change for individuals with specific chronic conditions. The results of the systematic review are presented in this document. The results were also used to inform the implementation research associated with the rapid evidence (RapidE) product.

This systematic review outlines the available evidence on the effectiveness of health behaviour change interventions for people with the following chronic diseases:

- diabetes
- chronic obstructive airways disease
- asthma
- stroke
- hypertension.

The review also looked at non–disease specific interventions. These particular chronic diseases were chosen as they represent the highest self-reported chronic disease burden for Non-Maori, Maori and Pacific People in New Zealand.[18] Due to the nature of the way the literature is organised a set of target behaviours were also chosen. That is, behavioural interventions are often designed to affect a target behaviour within the context of a chronic condition. These target health behaviours represent behavioural outcomes that are arguably most critical to improving the health for individuals with a chronic disease. For example increased physical activity is important to most of the chronic conditions of interest, while managing depressive symptoms in the context of an on-going illness is an important target. The target behaviours are:

- increased physical activity
- improved diet and managing weight
- decreased depression
- improving quality of life
- improving self-efficacy
- improving self-monitoring/clinical outcomes
- improving medication adherence
- decreasing health resource use
- managing blood pressure.

2 Methodology

2.1 Aims

The aims of the systematic review are to:

1. provide information on what are the most effective models of behaviour change for those target health behaviours important across a number of chronic conditions
2. determine what current chronic disease health behaviour change models best incorporate these effective theories and models of behaviour change in relation to the target behaviours
3. summarise briefly the most recent and pertinent systematic reviews on health literacy interventions for self-management of chronic conditions.

2.2 Research question

The following research question was developed to address the aims of the systematic review:

What is the effectiveness of health behaviour change interventions in adults with a diagnosed chronic condition (type 2 diabetes, stroke, hypertension,* COPD, asthma, and non–disease specific) for the following target behaviours:

- increased physical activity
- improved diet and managing weight
- decreased depression
- improving quality of life
- improving self-efficacy
- improving self-monitoring/clinical outcomes
- improving medication adherence
- decreasing health resource use
- managing blood pressure

when compared to usual care (note that usual care may encompass health education, health literacy approaches)?

* proxy for cardiovascular disease

2.3 Definitions of terms for health behaviour

A number of definitions have been used to guide this systematic review.

What is a Health Behaviour Change theory?
A health behaviour change theory is one that attempts to find the rationale behind alterations in a person's behavioural pattern.

What is a Health Behaviour Change Intervention?
A health behaviour change intervention is any theory, model or programme that has been developed on the basis of single or multiple behavioural change theories. Other models emerge from these as modifications, adaptations and extensions. It should be noted that theories and interventions are sometimes integrated and hence, it may be difficult to separate out the constituent parts (eg. Cognitive Behavioural Theory/Cognitive Behavioural Therapy). Some health behaviour change interventions have no evidence of a theoretical framework, that is, they have been developed in response to an identified gap.

What is chronic disease self-management?
Self-management and chronic disease self-management are generic descriptive terms that are used interchangeably to describe various interventions and approaches for people with chronic conditions. Some definitions of chronic disease self-management include:

> '…promotes the adoption of skills, behaviours and coping strategies to enable patients to actively participate in their health care and decision making and to maintain health and well-being.'[1]

> 'The systematic provision of education and supportive interventions by health care staff to increase patients' skills and confidence in managing health problems, including regular assessment of progress and problems, goal setting and problem solving support.'[2]

What is the difference between chronic disease self-management and patient education?
The primary focus of this systematic review is on chronic disease behavioural change. In some cases this may be called patient education or self-care. However, there must be evidence of **multiple** components that may include goal setting, self-efficacy, self-monitoring, treatment adherence, dealing with psychosocial consequences as well as an educational component (ie. knowledge, skills and confidence) to be considered self-management. Patient education provides disease-specific information and technical skills and is usually provided by a health professional.[3] Patient education is usually a component of a chronic disease self-management programme.

Note: In this systematic review we have substituted the generic term self-management for the term ***health behaviour change interventions***. This was done to ensure that the systematic review focuses on those interventions that aimed to change the behaviour of people with chronic conditions. Using the term health behaviour change interventions allows for clarity in reviewing and reporting on the literature and also enabled us to separate single and multiple theory interventions from other chronic care programmes and models.

2.4 Population

The population under consideration was adults (aged 18+) with one or more of the following chronic conditions:

- type 2 diabetes
- asthma
- chronic obstructive airways disease
- stroke
- hypertension*
- a non-specific (generic) chronic disease health behaviour change programme.

A non-specific (generic) chronic disease health behaviour change programme was included because with an aging population there is an increased chance of an individual having multiple chronic conditions. A generic approach may therefore be of interest.

Trials were excluded that recruited children, or where the data for adults could not be separated from that of children.

* Hypertension is being used as a proxy for cardiovascular disease.

2.5 Type of studies

Only guidelines, systematic reviews and randomised controlled trials (RCTs) in the English language were included in this systematic review. Quasi-randomised trials, non-randomised studies, observational studies, and case series studies were excluded. Editorials, commentaries, case studies, letters, theses and books were also excluded.

Where trials reported on secondary analysis or post hoc analysis, the original study was appraised if it met all other inclusion criteria. Papers reporting on post hoc analysis were not critically appraised, but the data were included in the review.

Pilot studies were not be appraised, due to the inherent risk of reporting bias. This bias arises when pilot studies produce the anticipated beneficial results but the main study does not replicate the findings. Authors tend to only publish positive results from a pilot study (as non significant results are often not funded for further study) and thus what emerges is reporting and publication bias. Also pilot studies use smaller sample sizes and are therefore unlikely to be powered to detect true differences between intervention and control groups for a specified outcome. The pilot studies identified in the searches are referenced in Appendix 1.

2.6 Types of interventions

Trials were included if the interventions were delivered in the primary care setting (including community settings, clinics and out-patient departments). The interventions had to be:

- behavioural interventions based on a single health behaviour change theory (eg. Transtheoretical Model, Social Learning Theory or Cognitive Behavioural Theory)
- behavioural interventions based on multiple health behaviour change theories
- programmes or models (ie. a structured programme with multiple components) based on a single health behaviour change theory
- programmes or models (ie. a structured programme with multiple components) based on multiple health behaviour change theories
- adaptations or modifications of existing programmes or models
- interventions with no evidence of a theoretical framework based on health behaviour change theory.

Studies reporting on 'extended' chronic disease models that included community prevention (ie. population health approaches) were excluded. Studies in acute settings were also excluded. Based on the definitions of self-management being multi-component, studies reporting on patient education or self-monitoring as a single component intervention were also excluded.

2.7 Outcomes

The target outcomes/behaviours were:

- increased physical activity
- improved diet and managing weight
- decreased depression
- improving quality of life
- improving self-efficacy (Self-efficacy is the belief that one is capable of performing in a certain manner to attain certain goals. Higher levels of self-efficacy are linked with an increased likelihood of changing those goals.)
- improving self-monitoring/clinical outcomes
- improving medication adherence
- reducing health resource use (non-routine visits to a health professional, Emergency Room attendance and hospitalisation)
- managing blood pressure.

2.8 Electronic databases

The search strategy used for Medline and Embase can be referred to in Appendix 2. These search strategies were modified as required for the other electronic databases.

The following electronic databases were systematically searched from 2005 to the present:

- Medline
- Embase
- PubMed
- Cinahl
- all EBM resources on Ovid – this includes the Cochrane Database
- ERIC (Education)
- PsychInfo
- Web of Science
- CCTR
- Sociological Abstracts
- APAIS

2.9 Other sources

Other sources that were used to identify potential studies were:

- Guidelines International Network
- Ministry of Health
- Google
- National Guideline Clearing House
- TRiP Database
- National Electronic Library for Health

2.10 Quality appraisal

2.10.1 Guidelines

Relevant guidelines were assessed using the AGREE II instrument[4] for which the three outcome categories are: recommends guidelines, recommends with modifications and does not recommend.

2.10.2 Systematic reviews

NZGG used adapted checklists from the Graphic Appraisal Tool for Epidemiology (GATE) framework to evaluate the quality of systematic reviews and/or meta-analyses. These can be provided upon request, the original tools can be accessed at http://www.fmhs.auckland.ac.nz/soph/depts/epi/epiq/ebp.aspx.

The quality scores from the critical appraisal process using the GATE framework indicate whether each quality criterion has been met, is unmet, whether there is insufficient information to make a judgment, or minor flaws. Each checklist evaluates three domains (internal validity, precision and applicability) and an overall assessment of the study quality (based on a synthesis of the scores for the three domains).

This overall assessment includes the reporting of any major flaws that could affect the validity of the findings and the relevance to clinical practice. The overall quality ratings assigned to each study, for this review are:

- '*good quality':* with low risk of bias or measurement error (+)
- '*mixed quality':* not well reported, missing data or minor flaws (?)
- '*poor quality':* significant methodological flaws (X)

2.10.3 Randomised controlled trials

Randomised controlled trials were appraised using Cochrane Collaboration methodology (www.cochrane.org/training/cochrane-handbook). An assessment is made for method of randomisation, allocation concealment, blinding, reporting and attrition bias. A rating is given for high, low or unclear quality, and risk of bias. Risk of bias is based on clarity and acceptability of:

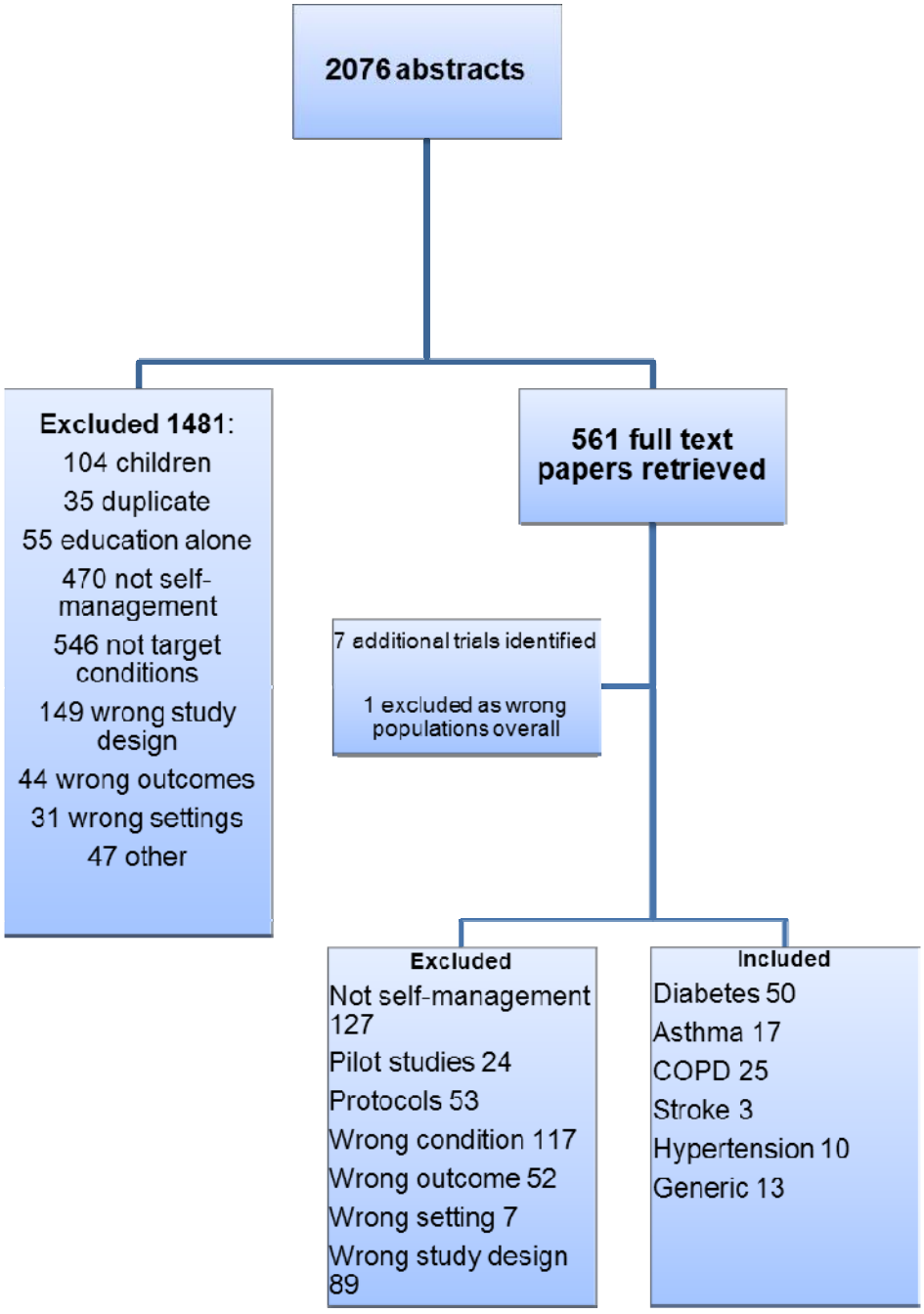
- method of randomisation (use of computer generated numbers used, rolling dice, coin toss)
- allocation concealment (use of sealed opaque envelopes used to prevent knowledge of which group the subject was allocated to)
- blinding (subject, researchers and/or outcome assessors are unaware of which group the subject was allocated to)
- attrition (losses through exclusion, loss to follow-up or withdrawal)
- reporting bias (outcomes differ from those in trial protocol or detailed in the methods section of the scientific paper).

The Cochrane method was used in this particular review given the large number of trials to be reviewed, the complexity of the data included, and the useful visual output of the assessment that the Cochrane method creates.

2.11 Study retrieval

Figure 1 illustrates the number of abstracts identified and sifted. In total, 118 randomised controlled trials and systematic reviews were appraised and summarised.

Figure 1. Flow diagram of study retrieval



3 Health behaviour change interventions

Included in this section are descriptions of the most well-known and well-utilised health behaviour change theories AND health behaviour change interventions and programmes as identified from a very large body of literature. The list is not exhaustive. However, these are the interventions primarily cited in this review. Often, the theories and interventions comprise two parts of a single approach, that is, an intervention is developed and the theory informing it is explained for the first time.

3.1 Interventions based on single or multiple health behaviour change theories

3.1.1 Transtheoretical Model or Stages of Change Model

In this integrative model, first described by Prochaska in the 1980s, behaviours can be modified or added. The model is based on the decision-making of the individual. Behaviour change was conceptualised as a five-stage process, or continuum, related to a person's readiness to change (stages of change): pre-contemplation, contemplation, preparation, action and maintenance. People are thought to progress through these stages at varying rates, often moving back and forth before attaining the goal of maintenance. In this model, people use different processes of change as they move from one stage of change to another. Thus, efficient self-change depends on doing the right thing (processes) at the right time (stages). According to this theory, tailoring interventions to match a person's readiness or stage of change is essential. The model comprises emotions, cognitions and behaviours, and includes measures of self-efficacy and temptation. It has been used to modify target behaviour such as smoking cessation and stress management. The Transtheoretical Model claims to have a higher participant retention rate than other models and a more appropriate assessment of outcome.

3.1.2 Social Learning/Social Cognitive Theory

Social Learning Theory (also known as Social Cognitive Theory) (Bandura, 1977) proposes that behaviour change is affected by environmental influences, personal factors, and attributes of the behaviour itself. These can affect, or be affected by each other. A central tenet of Social Learning Theory is the concept of self-efficacy. As well as belief in the behavioural change the individual must value the outcomes they believe will occur as a result. Outcomes may be classified as having immediate benefits (eg. feeling energised following physical activity) or long-term benefits (eg. experiencing improvements in cardiovascular health as a result of physical activity). Self-efficacy can be increased in several ways, including; by providing clear instructions, providing the opportunity for skill development or training, and modelling

the desired behaviour. Cognitive Behavioural Theory is related to Social Learning Theory in that our thoughts control our behaviour. The process requires some self-reflection and requires attention to internal dialogue to facilitate changes to behaviour.

3.1.3 Theory of Reasoned Action and Theory of Planned Behaviour

This social cognitive theory (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) of reasoned action states that individual performance of a target behaviour is determined by the person's intention to perform that behaviour. This intention is determined by their attitude toward the behaviour and the influence of their social environment or subjective norm. The shared components are behavioural beliefs and attitudes, normative beliefs, subjective norms and behavioural intentions. The Theory of Planned Behaviour adds to the Theory of Reasoned Action, the concept of perceived control over the opportunities, resources, and skills necessary to perform a behaviour. These are considered to be critical in behavioural change. This is congruent with the concept of self-efficacy.

3.1.4 Cognitive Behavioural Theory and Cognitive Behavioural Therapy (CBT)

This is a highly-structured psychotherapeutic method used to alter distorted attitudes and problem behavior by identifying and replacing negative inaccurate thoughts and changing the rewards for behaviours. It was first described by Beck in the 1960's. The therapy uses a multi-system model in which the assessment mainly is done based on cognitive and behavioural observations. Other factors (social, biological, spiritual, interpersonal) are also taken into consideration.

Cognitive Behavioural Therapy attempts to help an individual make sense of overwhelming problems by breaking them down into smaller parts. This makes it easier to see how they are connected and therefore how they affect that person. How you think about a problem can affect how you feel physically and emotionally. It can also alter what you do about it. There are helpful and unhelpful ways of reacting to most situations, depending on how you think about them.

Cognitive Behavioural Therapy can take place on a one to one basis or with a group of people. It can be conducted from a self-help book or computer programme. The duration of the intervention can range from six weeks to six months depending on the problem and the individual and sessions usually last 30 to 60 minutes with a trained therapist.

The process involves the patient describing the problem and their background. There is short, intermediate and long-term goal setting. The patient is often required to keep a diary to document individual patterns of thoughts, emotions, bodily feelings and actions. Unhelpful thoughts and behaviours are identified and 'homework' is given to try and find a process to find alternate actions or thoughts. The benefit is that the learned skills can be used after the therapy has finished.

Cognitive Behavioural Therapy has been shown to help with many different types of problems, including anxiety, depression (generalised and disease specific), panic, phobias (including agoraphobia and social phobia), stress, bulimia, obsessive compulsive disorder, post-traumatic stress disorder, bipolar disorder and psychosis, chronic pain.[5] It has been demonstrated to be of use in some target behaviours such as smoking cessation.[6]

3.1.5 Empowerment Theory

Empowerment Theory is grounded in the recognition of an individuals' autonomy. The role of health professionals is to enable the individual through knowledge and confidence to be able to make informed choices. Empowerment is based on patients being valued and accepted as being experts living with their condition; to actively participate in the learning process, and to discuss their feelings towards living with their condition and the way it impacts on their everyday lives. Patients are encouraged to have autonomy by working in alliance with professionals to identify successful strategies.[7]

3.1.6 Discovery Learning

Discovery Learning is an inquiry-based, constructivist learning theory that takes place through exploration and manipulation. It results in the individual being able to be more likely to remember concepts and knowledge. Proponents of the theory suggest the model is more likely to encourage active engagement, promote motivation, independence, creativity and problem solving skills.[8, 9]

3.1.7 Ecological Theory

Ecological Theory is a developmental theory proposed by Brofenbrenner in the late 1970's. It proposes that development is influenced by environmental factors such as the setting in which the individual lives (home, peers, neighbourhood, work) and interactions between these settings. Cultural contexts and external social influences are also emphasised in this theory.

3.1.8 Self-regulation Theory

Self-regulation is a common feature of cognitive and behavioural therapies. Karoly (1993) defines self-regulation as a process that enables an individual to guide goal-directed activities, not only over time but also over changing circumstances. Regulation usually requires modulation of thought, affect, behaviour and attention through a predetermined use of mechanisms and skills. For example, self-regulation is characterised by factors including goal setting, self-monitoring, activation, self-evaluation, self-efficacy and implementation.[10]

3.2 Behaviour change programmes or models based on a single health behaviour change theory (including adaptations or modifications)

3.2.1 Health Belief Model

This model is based on Social Cognitive Theory and was first developed by Rosenstock in the 1960s. The Health Belief Model attempts to explain and predict health behaviours by focusing on the attitudes and beliefs of individuals. There are a number of constructs that include the perceived severity and individual susceptibility to an illness and the benefits and barriers of taking a preventive action. The model also incorporates cues to action (eg. leaving a written reminder to oneself to walk) in eliciting or maintaining target behaviour. Self-efficacy, or the confidence in one's ability to successfully perform an action, has been added to the model. The model has been applied to: 1) preventive health behaviours, including health-promoting (eg. diet, exercise) and health-risk (eg. smoking) behaviours 2) sick role behaviours, that is, compliance with recommended medical regimens and 3) clinic use, which includes physician visits.

3.2.2 Stanford Chronic Disease Self-Management Program

Based on Bandura's concept of self-efficacy within Social Learning Theory, the Stanford Model (sometimes called the Lorig course or the Chronic Disease Self-Management Program) was developed at Stanford University, USA in the 1990s and is used worldwide. Stanford University initially developed the Arthritis Self-Management Program in the 1980s but recognised that self-management skills are common to a range of chronic diseases. Subsequently, a group therapy program appropriate for anyone with a chronic disease was developed through a stringent evaluation process. The structured model reduces sense of isolation and facilitates self-efficacy. There is a focus on goal setting and problem solving.

The Stanford Model is a face-to-face workshop lasting two and a half hours, once a week, for six weeks, in community settings such as senior centres, churches, libraries and hospitals. People with different chronic health problems attend together. Workshops are facilitated by two trained leaders, one or both of whom are non-health professionals with a chronic disease themselves.

Subjects covered include: 1) techniques to deal with problems such as frustration, fatigue, pain and isolation, 2) appropriate exercise for maintaining and improving strength, flexibility and endurance, 3) appropriate use of medications, 4) communicating effectively with family, friends and health professionals, 5) nutrition and 6) how to evaluate new treatments.

3.2.3 The Expert Patients Programme

The Expert Patient Programme (EPP) is a modification of the Stanford Model that has been adapted for internet use. The programme aims to deliver self-management support and improve quality of life of people with long-term conditions by developing generic self-management skills and improving confidence and motivation to take control over their illness and their everyday lives. The EPP is a six week course (2.5 hour sessions) delivered by trained peer leaders. It is now integrated into the UK healthcare system. The course features self-management of long-term conditions and the content includes pain and medication management, relaxation, diet, exercise, communication with health professionals, problem solving and action planning.[11]

3.2.4 Chronic Care Model and Extended Chronic Care Model

The Chronic Care Model (CCM) (MacColl Institute) was developed by Wagner based on a review of the literature and draws on Social Learning/Cognitive Theory, in particular self-efficacy. The model identifies the essential elements of a health care system that encourage high-quality care. These elements are the community, the health system, self-management support, delivery system design, decision support and clinical information systems. The model acknowledges the central role of the patient in their care that involves a responsibility for their own health. It involves an integrated approach with development of care plans and support. It is perceived as a framework for change.

The expanded CCM introduces health promotion to individuals and communities for prevention and management of chronic disease. The Expanded CCM supports the intrinsic role that the social determinants of health play in influencing individual, community and population health.

3.2.5 The 5As Behaviour Change Model

The 5As Model is intended for use with the CCM. It is an international approach developed by the United States Department of Health (1996) as a smoking cessation intervention. The 5As Model is used in primary health care to provide structure to the interaction between health professionals and clients. It is used for detection, assessment and management of smoking, nutrition, alcohol and physical activity (SNAP) risk factors. The 5As are:

- Assess – Ask about the behaviour
- Advise – Give a clear message of encouragement to change
- Agree – Set goals based upon readiness to change
- Assist – In knowledge acquisition, skills, confidence and support
- Arrange – Referrals and schedule in follow-up contacts

3.2.6 The Innovative Care for Chronic Conditions model

This is an alternative modification of the Chronic Care Model (ICCC) that has been recommended by the World Health Organization.

3.3 Behaviour change programmes or models based on multiple health behaviour change theories

3.3.1 The Flinders Program™ (The Flinders Model)

This programme is based on Cognitive Behavioural Theory, Problem Solving and Motivational Interviewing techniques. The 'Flinders Model' of Chronic Condition Self-Management was developed at Flinders University in South Australia in the 1990s. The model emerged as a result of the SA HealthPlus trial. It became evident that 'self-management' was a key factor in determining a client's need for a 'coordinator' to work with them and their general practitioner. A literature review was undertaken to look at what 'self-management' was and what tools were available to support 'self-management'.

The aim of the program is to provide a consistent, reproducible approach to assessing the key components of self-management that:

- improves the partnership between the client and health professional(s)
- collaboratively identifies problems and therefore better (ie. more successfully) targets interventions
- is a motivational process for the client and leads to sustained behaviour change
- allows measurement over time and tracks change
- has a predictive ability, ie. improvements in self-management behaviour as measured by the Partners In Health (PIH) scale, related to improved health outcomes.

A number of assessment tools are used to identify target areas for self-management. These are the Partners in Health Scale, the Cue and Response interview and Problems and Goals Assessment. The summary from these tools is used in the self-management care plan, which includes documentation of self-management tasks by the patient and self-management education the person will access over the following 12 months.

The programme involves the identification of issues and problems to target, agreed goals and agreed interventions, and a sign-off between patient and health professional with review dates. Practitioners providing the programme have to be accredited and the programme is delivered one-on-one. An assessment takes 45 to 60 minutes by a competent practitioner.[12]

3.3.2 Motivational interviewing

Motivational Interviewing has been linked to the Transtheoretical Model of Behavioural Change and 'readiness to change'. Motivational Interviewing appears consistent with a number of models of health behaviour, such as Theory of Reasoned Action, Social Cognitive Theory, Health Belief Model (HBM), and Self-regulatory Model. Motivational Interviewing was first described in the early 1980s by Miller. A recent definition of Motivational Interviewing is '…a collaborative, person centred form of guiding to elicit and strengthen motivation for change.' (www.motivationalinterviewing.org)
The common constructs which are the focus of Motivational Interviewing are 1) the patient's expectations about the consequences of engaging in the behaviour, 2) the influence of the patient's perception of, or beliefs about, personal control over the behaviour, and 3) the social context of the behaviour.

Motivational Interviewing is directed at changing targeted behaviours using a patient-centred approach using a brief intervention.[13] A brief intervention typically comprises sessions of five to 60 minutes of counselling and education, provided over three to five sessions. The main focus of Motivational Interviewing is to facilitate behaviour change by helping patients to explore and resolve their ambivalence about the behaviour change. Motivational Interviewing differs from other patient-centred approaches as it is directive. The patient is more likely to choose to change their behaviour in the desired direction, and systematic strategies are used in order achieve this.[13] The key components are:

- feedback
- that responsibility for change lies within the individual
- advice giving
- menu of change options
- empathic style
- enhanced self-efficacy.

As the intervention has developed over time there is additional emphasis on the importance of eliciting and reinforcing 'change talk' and the strength of change talk, which has been implicated as being predictive of behavioural change. There is also additional emphasis on what is referred to as the 'spirit' of Motivational Interviewing. This has three key elements: collaboration (between therapist and client), Evocation (drawing out ideas from the client rather than imposing ideas), and Autonomy (self-directed change rather than imposing authority of the therapist) (www.motivationalinterviewing.org).

Patients typically are encouraged to talk about their day and be involved in agenda setting for the discussion. The patient is encouraged to develop a list of pros and cons for a behavioural change and when they indicate a desire to change this is facilitated by the therapist/doctor/nurse.

Sessions can last five to 120 minutes and can be delivered as individual or group sessions and by various media including face-to-face and telephone. Delivery via computerised manual is also being explored. The sessions are brief and there may

only be one session or five or more.[14] The intervention is used particularly in the addictions field (alcohol, smoking) and the majority of the published research is around alcohol misuse[15] and smoking cessation studies.[14-16]

3.4 Behaviour Change Interventions with no evidence of a theoretical framework based on health behaviour change theory

There are also health behaviour change interventions that appear to be atheoretical, that is, there is no evidence of a theoretical framework behind the intervention or no reporting of a theoretical framework. Examples include:

- **Action plans** – These are individualised written instructions that are developed with a doctor. They detail how that individual will deal with their condition in the primary care setting. Action plans usually include a list of triggers for the condition and details of medication including how and when it should be used.
- **Pulmonary rehabilitation programmes** – These refer to a series of services that are directed at the patient with pulmonary disease and their family/carers. It is usually delivered by various members of the multidisciplinary team. The individualised programme aims to achieve and maintain the maximal level of independence and functioning in primary care settings. This is usually achieved through patient and family education, exercise training, psychosocial and behavioural interventions, and outcome assessment.
- **Problem solving** – This is a mental process that involves working through details of a problem to reach a solution.

4 Type 2 diabetes health behaviour change interventions

Summary for people with type 2 diabetes

Interventions based on single or multiple health behaviour change theories
The evidence suggests that behaviour change interventions based on Social Learning Theory and Self-regulation were most effective at improving some of the target behaviours identified in this systematic review.

Programmes or Models based on single or multiple health behaviour change theories
All of the models or programmes that were identified were based on Social Learning Theory and/or Self-regulation. Motivational Interviewing was the most effective at improving some of the target behaviours examined in this systemic review.

Interventions with no evidence of a theoretical framework based on health behaviour change theory
Health behaviour change interventions that were not based on a health behaviour change theory were also effective at improving some of the target behaviours.

Overall, health behaviour change interventions for people with type 2 diabetes were most effective for increasing physical activity and increasing self-efficacy.

Summary of health behaviour change interventions for people with type 2 diabetes

	Increased physical activity	Improving Diet and weight management	Decreased depression	Improved quality of life	Increased self-efficacy	Clinical outcomes/self-monitoring (including glycaemic control)	Medication adherence	Decreased health resource use	Managing blood pressure
Social Learning Theory (Self-efficacy)	+	+	+	+	+	?	NR	NR	?
Self-regulation	+	+	NR	=	+	?	=	NR	NR
Empowerment Theory	?	?	+	=	=	?	NR	=	+
Motivational Interviewing	+	=	NR	+	+	?	+	NR	NR
Stanford Chronic Disease Self-Management Programme	=	?	?	=	+	?	NR	=	=
Chronic Care Model	+	?	NR	=	+	=	NR	NR	?
5As Counselling	NR	NR	NR	NR	=	+	NR	NR	NR
No theoretical framework	+	?	NR	=	+	?	=	?	+

NR not reported; + evidence suggests a benefit for self-management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

Diabetes is a metabolic condition associated with high levels of morbidity and mortality. It is a risk factor for cardiovascular disease, blindness, kidney disease and vascular disease, particularly of the lower extremities. Type 2 (or type II) diabetes is also known as late onset diabetes and is associated with insulin resistance. Treatment may involve lifestyle modification or medication. Modifiable risk factors include obesity and sedentary lifestyle. The global prevalence of diabetes in adults aged 20 to 79 years was predicted to be 6.4% in 2010 increasing to 7.7% by 2030.[17] One in 20 adults in New Zealand had a clinical diagnosis of diabetes (excluding gestational diabetes).[18]

An epidemiological report predicted an estimate of 11,000 new diagnoses, 180,000 prevalent diagnoses and 1900 deaths attributable to a diagnosis of type 2 diabetes in 2011 in New Zealand.[19] Within New Zealand the prevalence of diabetes in Māori and Pacific populations is around three times greater than for other New Zealanders. Prevalence is also high amongst South Asian populations (www.moh.govt.nz/diabetes; accessed 28/03/2011). Diabetes was also associated with higher areas of deprivation where a diagnosis of diabetes was twice as likely as for those living in the least deprived neighbourhoods.

The aim of this chapter is to establish the effectiveness of health behaviour change interventions for improving specific target behaviours in patients with type 2 diabetes. The target behaviours are physical activity, dietary behaviours and weight management, depression, quality of life, self-efficacy, self-monitoring, medication adherence, health resource use and blood pressure management.

The chapter also provides information on which comprehensive chronic care programmes (a commonly used type of health behaviour intervention) are clearly based on theories of health behaviour change and how effective each programme is.

4.1 Body of evidence

4.1.1 Systematic reviews

Ten systematic reviews of health behaviour change interventions for patients with type 2 diabetes were identified (refer to Supplementary Material A for RapidE Chronic Care Systematic Review at www.nzgg.org.nz for further details):

- one was considered to be of good quality [20]
- four were considered to be of mixed quality[1, 21-23]
- five were considered to be of poor quality.[24-28]

Five systematic reviews attempted to report evidence for a theoretical basis of the self-management interventions (this was often not a comprehensive description), as reported in the included trials.[21, 23, 26, 28, 29] However, the descriptions were incomplete and often could not be associated with individual trials. Due to inconsistent reporting of theoretical frameworks in the systematic reviews, those randomised controlled trials included in the systematic reviews and published between 2005 and 2010 were retrieved and appraised in full.

4.1.2 Randomised controlled trials

Thirty-seven scientific papers reporting on the results from 31 randomised controlled trials of health behaviour change interventions for patients with type 2 diabetes were identified (refer to Evidence Tables in Supplementary Material A for further details). The average reported ages of the target populations in the trials was between 50 to 60 years. Very few trials reported on younger or older populations. The majority of participants were not newly diagnosed, and many of the American studies had recruited patients with a Hispanic background. For those trials that did report on baseline A1c, the majority indicated a lack of glycaemic control (refer to Appendix 3 for further details of the demographics of included participants). Most trials (n=21) were conducted in the United States of America (USA),[30-50] eight trials were European, [51-58] four trials were from the Asia/Pacific region[59 60-62] and one was Mexican.[63]

- One trial was identified that was considered to be of high quality (low risk of bias).[51]
- Twenty-six trials reported in 31 papers were identified that were considered to be of mixed quality (unclear risk of bias).[30, 31, 33-41, 43-50, 53-59, 61-65]
- Four trials were identified that were considered to be of low quality (high risk of bias).[32, 42, 52, 60]

There was one secondary analysis identified that was not appraised.[66]

Overall the trials were of mixed quality with inadequate reporting of randomisation and allocation concealment techniques, a lack of blinding and inadequate reporting of attrition. Refer to Appendix 4 for a summary of the quality (and risk of bias) for these randomised controlled trials. Appendix 5 provides further details on the duration of interventions and who delivered them. Details of the individual components of the randomised controlled trials can be referred to in Appendix 6.

4.2 Summary of findings

4.2.1 Increasing levels of physical activity in people with type 2 diabetes

4.2.1.1 Interventions based on single or multiple health behaviour change theories

Two trials were based on Empowerment Theory. Deakin (2006) reported a sustained increase in participation in physical activity in the intervention group compared with the control at 14 months follow-up (difference 0.9 days/week, 95% Confidence Interval [CI] 0.3 – 1.6, p value not given),[51] whereas Cooper (2008) reported no differences in exercise patterns at 12 months follow-up between intervention and control groups.[53]

Three interventions based on Self-regulation Theory were identified. Thoolan (2009) reported that exercise intention was significantly higher in the intervention compared with the control group at follow-up ($p<0.0001$) and participation in exercise over the previous seven days was also higher in the intervention group ($p<0.0001$).[58] Kulzer (2007) reported that regular exercise was significantly more stimulated in the health behaviour change intervention compared with the control group.[57] Toobert (2011) reported that the number of

days per week exercise was undertaken was improved in the intervention group at six months compared with usual care but not sustained at 12 months and there was no significant difference between the two groups.[30]

Within a systematic review of Interactive Health Communication Applications, one of 24 randomised controlled trials reported on physical activity in diabetes. The average number of minutes of physical activity undertaken per week was found to be higher in the control group at ten months follow-up (Standardised Mean Differences [SMD] 0.09, p value not given).[23] The interventions in the systematic review appeared to be based primarily on self-efficacy (specifically, Social Learning Theory).

Overall, the results were mixed for interventions based on single or multiple health behaviour change theories. Whilst some reported a benefit over the control group other trials only reported an equivalent effect.

4.2.1.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Four trials reported on Motivational Interviewing/health coaching.[32, 41 45, 48] Both King (2006) and Christian (2008) reported that the proportion of participants taking part in moderate physical activity per week increased significantly in the intervention group compared with the control group.[32,41] King (2006) also reported a significant increase in strength training in comparison to the control group ($p<0.001$).[41] Participation in sporting activities was low in both groups and remained virtually unchanged at follow-up.[41] Schillinger (2009) used Motivational Interviewing within the Chronic Care Model. An automated telephone health behaviour change intervention was reported to increase physical activity by two or more hours per week compared with usual care ($p=0.03$).[48] In a study of health coaching the intervention group reported significant increases in exercise frequency per week ($p=0.026$), no such change was observed in the control group. However, there were no statistical comparisons reported for differences between the intervention and control groups. [45]

Four trials reported on the Stanford Model or a variant.[43, 46 31] One variant of the programme used an internet model that was individualised and led by a moderator.[47] Lorig (2009) reported an increase in the amount of aerobic exercise undertaken in the intervention group compared with the control group ($p=0.049$).[46] No differences were identified between intervention and control groups in the remaining three trials.[31, 43, 47]

Samuel-Hodges (2006, 2009) used the Chronic Care Model. Although there was no difference in the hours of physical activity undertaken per day, participation in moderate activity was significantly higher in the intervention group (8.1 minutes versus 5.4 minutes; $p=0.02$).[49, 50]

Overall, all but three health behaviour change interventions resulted in evidence of improved physical activity outcomes in the intervention compared to control group in people with Type 2 diabetes. Motivational Interviewing was effective in increasing physical

activity compared with control interventions. The Chronic Care Model also appeared to be effective in increasing physical activity. However, the evidence suggested that the Stanford Model was not effective in increasing physical activity for people with type 2 diabetes.

4.2.1.3 Behaviour Change Interventions with no evidence of a theoretical framework based on health behaviour change theory

Three trials and three systematic reviews were identified for which there was no evidence (or severely limited evidence) of a theoretical framework. The Look Ahead trial was led by a lifestyle counsellor and used a combination of individual and group sessions. On average after four years follow-up the intervention group was found to have greater treadmill fitness than the control group (12.74% versus 1.96%, p<0.001).[38] Watanabe (2007) reported that participation in leisure time activity on twelve or more occasions per month was achieved by 20% of the intervention group and 6% of the controls (p=0.022), walking one or more times per month was achieved by 24% of the intervention group and 9% of controls (p=0.0006).[62] Song (2009) found no differences between intervention and control groups for adherence to exercise.[59]

Fan (2009) also reported a significant benefit of self-management interventions on exercise (ES 0.40, p=0.00) in a meta-analysis of sixteen studies.[25] Two other systematic reviews did not report an overall benefit in improvements in physical activity. Only two of five trials identified by Shaw (2006) reported a benefit (increased participation in physical activity) and the remainder found no differences between groups.[1] Heinrich reported that only half of trials reporting on physical activity (5/10) identified a positive effect for this outcome with medium to large effect sizes. The remaining trials were suggestive of a lack of effect.[24]

4.2.2 Improving diet and managing weight in people with type 2 diabetes

For this outcome data were identified on changes to body mass index (BMI), changes in weight and changes in dietary behaviours.

4.2.2.1 Interventions based on single or multiple health behaviour change theories

Body mass index

Two interventions used an intervention based on Self-regulation Theory.[57 58] Both trials reported that body mass index **(**BMI) was significantly lowered in the intervention compared with control group and Kulzer (2007) reported that the decrease in BMI was sustained over time in a three year follow-up.[57]

Three trials used Empowerment Theory. Two trials reported no differences in BMI at follow-up in either the intervention or control group[53, 56] and one trial reported a significant decrease in BMI in favour of the intervention group (-0.2kg/m^2 versus +0.4kg/m^2, p<0.001).[51]

The evidence suggests that interventions based on Self-regulation Theory may be beneficial for reducing BMI. However, evidence from Empowerment-based theories was suggestive of a lack of overall effect.

Body weight

Davies (2008) reported on an intervention based on a combination of theories that included Empowerment and Social Learning Theory.[55] A significant difference in weight loss was reported in the intervention compared with control group that was sustained at 12 months follow-up.[55] Those who reported a greater increase in their perceived responsibility for their disease lost more weight at both four and 12 months.[55]

Two trials used Empowerment Theory.[51,42] Deakin (2006) reported a significant decrease ($p<0.001$) in body weight in the intervention group (-0.5kg) compared with controls (+1.1kg) [51] No differences in weight change between intervention and control group was observed by Anderson (2005a).[42]

Another trial, this time based on Social Learning Theory, principally self-efficacy, reported a significant decrease in weight ($p<0.001$) over time in the intervention group. No difference was observed in weight in the control group at follow-up. The trial did not report on differences between the intervention and control groups.[44]

Two systematic reviews reported decreased weight in the intervention groups.[26, 29] Huisman (2009) included trials based on Self-regulation and self-efficacy (specifically Social Learning Theory) and Deakin (2005) included trials reporting a variety of health behaviour change theories.

Overall, the evidence from both Empowerment and Social Learning Theory based interventions suggests that these theoretical frameworks may be effective in reducing body weight for people with type 2 diabetes.

Dietary behaviour

Two trials reported on interventions based on Self-regulation Theory. Thoolan (2009) reported significant improvements over the control group for dietary intention ($P<0.05$) and improved dietary habits ($p<0.001$). Fat consumption was also lower in the intervention group compared with controls ($p<0.01$).[58] The second trial used an individualised approach and reported significant improvements in the intervention group for cognitive restraint of eating, inhibition and hunger compared with the control group.[57] Toobert (2011) combined Self-regulation Theory and Social Cognitive Theory in a facilitator led, group intervention. The percentage of calories derived from fat was improved in the intervention group at six months follow-up compared with usual care (ES 0.6, $p<0.001$), but this difference was not sustained at 12 months.[30]

Two health behaviour change interventions were based on Empowerment Theory.[51, 53] Cooper (2008) reported no differences in dietary patterns between groups.[53] Deakin (2006) reported a significant increase in consumption of fruit and vegetables in the intervention group compared with controls (+2.4 portions versus +0.2 portions, $p=0.008$).[51]

One systematic review cited numerous theoretical frameworks in seven out of 19 included trials. Heinrich (2010) reported positive outcomes for dietary change.[24] In another systematic review that appears to include trials based on self-efficacy (Social Learning Theory), Murray (2009) identified a positive effect on increased reduction in the percentage of fat of calorific intake at six months follow-up, but this was based on only one of 24 randomised controlled trials using Interactive Health Communication Applications.[23]

Overall, those interventions based on Self-regulation Theory indicated a benefit in changing dietary behaviours which was not evident from the Empowerment based theories. The overall results from the evidence are equivocal for the benefits of self-management interventions on changes in dietary behaviour.

4.2.2.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Body mass index

Three interventions were based on the Stanford Model.[31, 43, 52] There were no differences between intervention and control groups in BMI. Nor were any differences identified in a trial using Motivational Interviewing within the Chronic Care Model in an individualised intervention led by health professionals.[48]

There was no evidence that structured self-management interventions were effective in reducing BMI.

Body weight

Two trials (three papers) used Motivational Interviewing as an intervention. One trial reported in two papers used individualised Motivational Interviewing within the Chronic Care Model. There was a significantly greater weight loss reported in the intervention group compared with usual care (-0.68kg versus 0kg; p=0.0007).[34, 64] Christian (2008)[32] reported no differences in weight loss between groups but did note that 21% of the intervention group had sustained weight loss of 5% or more at 12 months compared with 10.6% of the control group (p<0.01).[32]

Motivational Interviewing as an intervention within the Chronic Care Model was effective in reducing and sustaining weight loss.

Dietary behaviour

Two trials and four research papers reported on changes in dietary behaviour using the Chronic Care Model. Glasgow (2006, 2006a) reported a significant reduction in dietary fat intake in the intervention group compared with usual care (p=0.006), although there was no evidence for a difference in the intake of fruits and vegetables.[34, 64] Samuel-Hodge (2006, 2009) reported a decrease in the percentage of calories obtained from trans-fats compared with controls (p=0.05) but there were no other differences in food intake.[49, 50]

An intervention using the Stanford Model reported that healthy eating was significantly improved in the intervention group compared with the control group (p<0.01) in a peer-led group intervention.[46]

Both the Chronic Care Model and the Stanford Model indicated evidence of being effective in changing dietary behaviour.

4.2.2.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Body mass index

The one trial reporting on changes in BMI found no differences in either group with an individualised intervention led by health professionals.[61]

Weight loss

Averaged over four years of follow-up the intervention group was reported to have significantly greater weight loss in the Look Ahead trial (-6.15% versus -0.88%, p<0.001).[38] Watanabe (2007) reported that weight loss of ≥4kg was achieved by 13% of the intervention group and 4% of the controls (p=0.025).[62] Systematic review evidence (Chodosh, 2005) identified no differences in weight change between intervention and control groups in 17 comparisons from 14 randomised controlled trials. The systematic review did not report on the theoretical framework of the included trials.[22]

Dietary behaviour

Song (2009) reported an increased adherence to diet over time in both intervention and control groups and that this increase was significant for the intervention group. However, there were no significant differences between the intervention and control groups at follow-up at 12 weeks.[59] Watanabe (2007) reported that total energy intake (kcal/day) was significantly lower in the intervention group (-191±460 versus -34±434; p=0.008).[62] One systematic review was identified that did not report the theoretical framework of the included trials. Fan (2009) reported positive outcomes for dietary change.[25]

Overall, although these interventions did not state the theoretical framework on which they were based they did appear to be effective in reducing weight and improving dietary behaviour. However, they were not effective in reducing BMI.

4.2.3 Decreasing depression in people with type 2 diabetes

4.2.3.1 Interventions based on single or multiple health behaviour change theories

Davies (2008) used a health behaviour change intervention based on multiple theories including Empowerment and Social Learning Theory. Depression scores were lower in the intervention group compared to the control group and this was significant at 12 months follow-up (p=0.032).[55]

4.2.3.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Two trials reported on interventions based on the Stanford Model. Depression was significantly improved in participants in the intervention group compared with usual care (p<0.001).[46] In an internet-based self-management programme there were no differences between the intervention and control group.[47]

Overall, face-to-face interventions appear to be effective in reducing depression.

4.2.3.3 Behaviour Change Interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

4.2.4 Improving quality of life in people with type 2 diabetes

4.2.4.1 Interventions based on single or multiple health behaviour change theories

There were no differences between groups for negative wellbeing (expressions of negative emotion) in a self-regulation intervention compared with education alone, although both groups did show a reduction over time for this outcome.[57] A decrease in negative wellbeing implies increases in positive emotions and improved quality of life.

In an intervention based on Self-regulation and Social Learning Theory, Toobert (2011) found no differences between groups in physical or mental components of health-related quality of life.[30]

Two trials used an intervention grounded in Social Learning Theory (self-efficacy).[54, 60] Sturt (2008) used a self-led intervention and reported that diabetes-related distress was lower in the intervention group compared with controls (p=0.04).[54] This theoretical framework was also shown to be beneficial in a combined group and individual session intervention.[60] Quality of life was significantly increased in the intervention group compared with the control group at six months follow-up <0.0001).[60]

Two trials were based on Empowerment Theory.[55, 56] One trial combined Empowerment with multiple other theories including Social Learning Theory.[55] There were no differences reported in quality of life[55] or satisfaction with daily life between the intervention and control groups.[56]

Deakin (2005) reported quality of life from two studies in a systematic review. The interventions were based on numerous health behaviour change theories. One study found no overall improvement in quality of life whilst the other trial found improvement in both groups in mental health subscales, but no between-group differences. There were no differences in the physical health subscales.[29]

Overall, Social Learning Theory appeared to be effective in increasing quality of life, whereas empowerment and self-regulation appeared to indicate no evidence of a benefit over the control groups. Overall, the evidence is equivocal for a benefit of self-management interventions on improving quality of life.

4.2.4.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Three trials used the Chronic Disease Self-Management Programme (Stanford Model).[31, 43, 47] Lorig (2010) found no differences in health distress in an internet-delivered

intervention.[47] Anderson (2010) reported no significant differences in perceived health status following a one year telephone self-management intervention.[43] However, health distress was significantly lower in the intervention group compared with controls at 6 months follow-up (change -0.59 versus -0.09, p = 0.009) in a group-based, peer-led intervention.[31]

Four trials (6 papers) reported on the Chronic Care Model. Although no differences were observed in general health between groups there was a significant effect on increased mental wellbeing in the intervention group compared with the control group at 8 and 12 months follow-up. [49, 50]

Piatt (2006, 2010) used Empowerment Theory within the Chronic Care Model. Quality of wellbeing was sustained or improved in both intervention and control group but did not reach significance, and there were no details on statistical differences between the intervention and control groups.[36, 37] Glasgow (2006, 2006a) and Schillinger (2009) reported no differences in quality of life at follow-up in either the intervention or control group.[34, 64 48] These trials used Motivational Interviewing within the Chronic Care Model.[34, 64,48]

Motivational Interviewing was also used by Wolever (2010). The intervention resulted in improved quality of life in the intervention group at the end of the trial (p=0.027) and no differences in the control group over time. However there were no significant differences between the groups at the end of the trial.[45]

The health behaviour change programmes and models did not appear to be effective overall in increasing quality of life when compared with control interventions.

4.2.4.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

One trial reported no differences in quality of life at follow-up in either group in an individualised intervention led by health professionals.[61]

Two systematic reviews were identified. Shaw (2006) reported an improvement following a health behaviour change intervention in three out of four studies compared with controls. The remaining study reported no between-group differences. Studies did not indicate the magnitude of the change for a clinical benefit nor the long-term impact as the follow-up did not extend beyond 6 months.[1] Cochran (2008) noted that although the intervention group was found to have improved quality of life over time (p<0.001) there were no significant differences between the intervention and control groups.[28] Only three of twenty included trials reported on the theoretical framework.

Overall, there was no evidence of a benefit for health behaviour change interventions compared with control interventions.

4.2.5 Improving self-efficacy/self-control/empowerment in people with type 2 diabetes

4.2.5.1 Interventions based on single or multiple health behaviour change theories

Four trials reported on interventions based on Empowerment Theory.[42, 51, 53, 56] Deakin (2006) reported significant differences in favour of the intervention group for empowerment (p=0.04) and readiness to change (p=0.01).[51] No differences between intervention and control groups were identified by Adolfsson (2007) and Anderson (2005).[42, 56] No differences were identified between intervention and control groups in levels of perceived control.[53]

Social Learning Theory was the theoretical framework for the intervention described by Sturt (2008). Confidence to self-care was 11.2 points higher in the intervention group (95% CI 4.4 – 18.0, p=0.013).[54]

In an intervention based on Self-regulation Theory, Thoolan (2009) reported a sustained benefit in improved self-efficacy at one year follow-up.[58] Toobert (2011) used a combination of Self-regulation Theory and self-efficacy based theories that would include Social Learning Theory. The intervention improved self-efficacy at 6 months compared with usual care (ES 0.4, p<0.001) and this was maintained at 12 months.[30]

Ruggiero (2010) used the 5As counseling theory and behavioural coaching. There was no evidence of a benefit gained by the intervention group for empowerment.[33]

Deakin (2005) reported on a systematic review that included trials based on a wide variety of health behaviour change theories. One of thirteen included papers in a systematic review by Deakin (2005) reported on self-efficacy for which there was significant improvement in self-efficacy and empowerment in favour of the intervention which was sustained up to 14 months (p<0.001).[29]

In another systematic review Heinrich (2010) reported benefits in self-efficacy in the intervention groups in three of five studies. Seven of the 19 included studies reported mixed theoretical frameworks.[24]

The evidence suggests that Empowerment Theory was not effective in improving self-efficacy; however, Social Learning Theory and Self-regulation did show benefits in a limited number of trials.

4.2.5.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

One trial used Motivational Interviewing within the Chronic Care Model.[48] Interpersonal processes of care were significantly improved in an automated telephone individualised self-management intervention compared with a group session (p=0.03) or usual care (p<0.001); this included empowerment.[48] Self-efficacy was improved in both group

sessions and an automated individualised telephone self-management intervention compared with usual care (p<0.01).[48]
The remaining trials used the Stanford Model or a variant. There were no differences between intervention and control groups in levels of perceived empowerment.[52] Self-efficacy was significantly improved in the intervention group compared with controls at 6 months follow up (p<0.001).[31] Participants in the intervention group did demonstrate improvements in patient activation and self-efficacy in a peer-led group intervention and an internet-based self-management programme.[46, 47] This was sustained in follow-up at 18 months.[47]

Overall, the evidence suggests there is a benefit in improved self-efficacy following health behaviour change interventions.

4.2.5.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Shaw (2006) identified a benefit in increased self-efficacy in three of four studies reporting on this outcome in a systematic review.[1]

4.2.6 Improving self-monitoring/clinical outcomes in people with type 2 diabetes

For diabetes, the clinical outcome most frequently reported is the glycosylated hemoglobin test (haemoglobin to which glucose is bound in the blood) (A1c or HbA1c). The test is indicative of a person's average blood glucose level over the previous 2 to 3 months. A normal non-diabetic A1C is 3.5% to 5.5%. For diabetics an A1c <6.5% to 7% would be considered satisfactory, above 7% a diabetic would be considered to lack glycaemic control.

4.2.6.1 Interventions based on single or multiple health behaviour change theories

Two trials were based on Social Learning Theory. Bond (2007) found evidence of a reduction in A1c in the intervention group. No significant reduction was observed in the control group. However, the trial did not report on statistical differences between the intervention and control groups.[44] Neither were any differences between intervention and control groups found by Sturt (2008).[54] Within a systematic review that appears to be based on trials of self-efficacy (Social Learning Theory), two of 24 randomised controlled trials reported on changes in A1c following Interactive Health Communication Applications. One trial reported increased control in the intervention group (0.77, p value not given) and the second trial favoured the control group (SMD -0.23, p value not given).[23]

Two trials used Self-regulation Theory. Kulzer (2007) reported a decrease in A1c compared with the education alone control (p=0.017).[57] A health behaviour change intervention had no effects on mean levels or changes in A1c in an intervention using both group and individualised sessions. No statistical comparisons were made between the two groups.[65] Toobert (2011) used a combination of Self-regulation and self-efficacy based theories, that would include Social Learning Theory. Control of A1c was improved in the intervention group compared with control (Effect size ES 0.4, p<0.05). However the

improvement was not sustained at 12 months where it had returned to baseline levels.[30] In a systematic review of trials on Self-regulation and self-efficacy (Social Learning Theory), Huisman (2009) reported a significant decrease in A1c in the intervention group (ES 0.35, 95% CI 0.21 – -0.49, p<0.001).[26]

Empowerment Theory was employed as the principle theory in five health behaviour change interventions. Cooper (2008) reported significantly lower A1c levels in the intervention group at 6 months (p<0.0005) but this did not persist at one year. They also reported that the higher the baseline A1c level the greater the reduction at follow-up was likely to be and more frequent attendance also predicted a greater fall in A1c levels.[53] Deakin (2006) reported a significantly lower A1c at 14 months follow-up compared with controls (-0.6% versus +0.1%, p<0.001).[51] Deakin (2006) also observed that the increased frequency in self-monitoring observed in the intervention group earlier in the trial was not sustained at 14 months.[51] Similarly Cooper (2008) reported that differences observed in adherence to self-monitoring practice at 6 months (p=0.002) was not evident at one year. This may in part be due to a feeling of Mastery and belief that one did not have to monitor as frequently. The remaining three trials reported no differences in A1c levels between groups.[42, 55, 56] although Anderson (2005) reported that both groups showed a significant decrease in A1c over the 6 week study period.

An intervention based on a combination of behavioural coaching and 5As Counselling did report a significant decrease in A1c over time in the intervention group.[33]

Deakin (2005) reported on a systematic review in which some of the interventions were based on a variety of health behaviour change theories. The results of the meta-analyses in favour of group-based diabetes education programmes were sustained reduced glycated haemoglobin at four to six months (1.4%; 95% CI 0.8 – 1.9, p<0.00001), at 12 to 14 months (0.8%; 95% CI 0.7 – 1.0, p<0.00001) and 2 years (1.0%; 95% CI 0.5 – 1.4, p<0.00001).[29]

Heinrich (2010) reported that only five of 13 included studies suggested a decreased A1c level in favour of self-regulation interventions. Four of these studies used group interventions.[24] Less than half of the included trials in the review were known to have a theoretical framework.

There was no overall evidence to support the benefits of health behaviour change interventions improving glycaemic control, especially in the long term.

4.2.6.2 Behaviour change programmes or Mmodels (including adaptations) based on single or multiple health behaviour change theories

Seven trials (8 papers), using the Stanford Model, the Chronic Care Model, and Motivational Interviewing reported no differences in A1c between groups.[32, 34, 40, 43, 46, 48, 52, 64]

Three trials reported benefits following the Stanford Model. Lorig (2008) reported a significant reduction in A1c in the intervention group compared with the control group (-0.41% versus -0.05%, p=0.04). This effect was heightened in those with A1c ≥7% at baseline of whom 30% had reduced levels to below 7% at follow-up compared with 22% of

controls.[31] Following an internet version of the Programme, A1c was significantly lowered in the internet self-management group compared with usual care (p<0.039).[47] Lorig (2009) reported that the intervention group had statistically lower symptoms of hypoglycaemia (p=0.002) compared with usual care in a peer-led group intervention.[46]

Two trials (3 papers) reported on Motivational Interviewing or Health Coaching interventions. Following a Motivational Interviewing intervention, a significant (adj p<0.001) difference of 0.4% was reported between groups in one trial.[49, 50] Wolever (2010) noted that those in the intervention group (Health Coaching) with a baseline A1c ≥7% significantly reduced their A1c by an average of 0.64% over 6 months (P=0.03). [45]

Although there were no significant differences between groups following an intervention within the Chronic Care Model, it was noted that both intervention and control groups had demonstrated significant lowering of A1c from baseline to follow-up. [48]

Gregg (2007) used an intervention based on Acceptance and Commitment Therapy (ACT). ACT teaches individuals to accept their feelings and 'diffuse' or disengage from the content by focusing more mindfully on the process of thinking itself and to link this to goal-based action. Individuals are asked to work towards those goals and values they hold while experiencing their thoughts and feelings. A significant decrease in A1c from baseline to follow-up was observed in the intervention group.[40] There was also a significant effect in favour of the intervention group in maintenance of acceptable blood glucose control ie. maintaining A1c<7% (P=0.009).[40]

Overall, the evidence showed mixed results with some trials demonstrating a benefit of the intervention over the control group, and other trials reporting no evidence of a difference between intervention and control groups.

4.2.6.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

On average over a four year follow-up the Look Ahead trial reported a greater improvement in glycaemic control in the intervention group (-0.36% versus -0.09%, p<0.001).[38] A1c reduction of ≥0.3% was achieved by 14% of intervention group and 4% of controls (p=0.01).[62]

Song (2009) reported that A1c levels fell significantly in the intervention group (9.4% to 7.1%, p< 0.05) but there was no significant difference in A1c levels at follow-up between groups, although this was only a very short trial (12 weeks).[59]

Sixta (2008) reported no effect of a community worker-led self-management programme on a group of Mexican Americans on A1c. Those who had lived with the disease for longer were more likely to have better control (p=0.002) and older individuals were more likely to have poorer control (p<0.001).[63] Shibayama (2007) reported no significant changes in A1c either within or between groups.[61]

Four systematic reviews were identified that did not report the theoretical framework of the included trials. A meta-analysis of 20 self-management interventions indicated a clinically significant decrease in A1c in the intervention group (ES -0.36, 95% CI -0.52 – -0.21, p

value not given). This equated to a decrease of 0.81% in A1c.[22] Fan (2009) also reported a significant benefit in decreased A1c in favour of the intervention in nine studies (ES 0.70; p=0.00)[25]

Minet (2010) also reported a significant decrease in A1c. Adjusted data indicated a benefit for 'education' interventions. Those studies with a short follow-up period (< 12 months) showed a greater decrease in A1c than those greater than 12 months (P=0.0017).[21]

Only three of 10 studies demonstrated a benefit in favour of the intervention, although one of these was due to a deterioration in the control group, but no change in the intervention. Improvements were not sustained beyond 12 months and were not assessed in the long term.[1]

Overall, the evidence does not support the efficacy of health behaviour change interventions for improving glycaemic control compared with controls groups.

4.2.7 Improving medication adherence in people with type 2 diabetes

4.2.7.1 Interventions based on single or multiple health behaviour change theories

In an intervention based on Self-regulation, no significant differences were identified between the intention to take medication, or the adherence to medication groups.[58] This is probably due to the fact that the participants under investigation in this trial were newly diagnosed and baseline adherence was already high.

4.2.7.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

There was a significant reduction in perceived barriers to medication adherence in a Health Coaching intervention group (p=0.001) and this differed significantly from the control group at the end of the trial (p=0.036). [45] Actual medication adherence improved significantly in the intervention group (p=0.004); however, there were no differences between the intervention and control groups at the end of the trial.[45]

4.2.7.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Song (2009) found no differences between intervention and control groups in adherence to medication at 12 weeks follow-up.[59]

4.2.8 Reducing health resource use in people with type 2 diabetes

4.2.8.1 Interventions based on single or multiple health behaviour change theories

Adolfsson (2007) reported the results of a trial for which the intervention was based on Empowerment Theory. There were no differences between intervention and control groups in health resource use.[56]

4.2.8.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Lorig (2008, 2009) reported no differences between groups in health service utilisation in interventions based on the Stanford Model.[31, 46]

4.2.8.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Shibayama (2007) reported that the intervention group visited the hospital more frequently than the control group at one year follow up (p=0.03).[61]

Shaw (2006) reported on health service use as reported in one of eleven included papers. The intervention group was more likely to visit a podiatrist at 3 to 6 months follow-up (p=0.05), but this did not persist at one year. There was no evidence of a difference between groups for visits to the hospital or doctor over 12 months.[1] This systematic review did not refer to theoretical frameworks of included studies.

4.2.9 Managing blood pressure in people with type 2 diabetes

4.2.9.1 Interventions based on single or multiple health behaviour change theories

Two trials based on Empowerment Theory[42, 51] found no differences between intervention and control groups in blood pressure outcomes.

Two trials reported on interventions based on Social Learning Theory.[44, 54] Bond (2007) reported a significant lowering of diastolic blood pressure within the intervention group of 6.8 mm Hg (p<0.01) compared with 5.2 mm Hg in the control group (Not significant [ns]), however, there were no significant differences reported between the intervention and control groups.[44] Sturt (2008) reported significant differences in blood pressure between the intervention and control groups in favour of the intervention group.[54]

Deakin (2005) suggested that group interventions were effective at reducing systolic blood pressure at four to six months (5 mm Hg: 95% CI 1 – 10, p=0.01).[29] This systematic review reported that some of the interventions were based on a variety of health behaviour change interventions but did not clearly specify which.

Heinrich (2010) reported no effects on blood pressure changes between intervention and control groups.[24] However there was substantial clinical heterogeneity within the included studies.[24] Less than half of the included studies in this review reported a mixture of theoretical frameworks.

There was no clear evidence that health behaviour change interventions based on single or multiple behavioural change theories were effective at lowering blood pressure in participants with diabetes.

4.2.9.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Two trials of the Stanford Model, or a variant, found no differences in blood pressure outcomes between groups.[43, 52]

Two trials (3 papers) reported on interventions within the Chronic Care Model. In a trial of individualised Motivational Interviewing, Schillinger (2009) found no differences between groups in blood pressure.[48] An intervention based on multiple theories reported diastolic blood pressure to be significantly lower in the control group at 8 months (mean difference 3.3 mm Hg; 95% CI -5.2 – -1.4, p<0.001).[49, 50] Within the Chronic Care Model, improvements in systolic blood pressure that had been observed at 1 year were sustained at three years, although there were no differences between groups.[36, 37]

Structured self-management programmes do not appear to be effective at reducing blood pressure in participants with diabetes.

4.2.9.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Shibayama (2007) found no differences between intervention and control groups in the outcome of blood pressure.[61] The Look Ahead trial reported a significant lowering in both systolic (p<0.001) and diastolic (p<0.01) blood pressure in the intervention group.[38]

Fan (2009) reported a significant benefit in decreased systolic blood pressure in twelve studies (p=0.00) and diastolic blood pressure in ten studies (p=0.00) in a systematic review.[25]

The evidence is equivocal for blood pressure outcomes in trials that do not report a theoretical framework.

4.3 Limitations of trial evidence for people with type 2 diabetes

The evidence identified in this systematic review should be interpreted in the context of a number of limitations. The intervention and control group were not always well matched at baseline,[30, 43, 55, 58-61] this indicates that the process of randomisation has not been

effective. Some of the trials were over-represented by females and this may be due to the recruitment methods.[42, 43, 45-47, 59, 60, 63] Many of the trials only reported on short-term follow-up (less than 6 months).[34, 64 31, 41, 42, 44-46, 59, 60] Some of the trials are also subject to recruitment or selection bias. By advertising through the media and community notices the participants are more likely to be better educated and female. There is a concern in some of the trials that those randomised may not be representative of those eligible, in particular, where the participants are self-selected. The trial authors make little or no attempt to examine this form of bias.[30, 41, 43, 53-55, 58]

4.4 Overall summary of health behaviour interventions for people with type 2 diabetes

Social Learning Theory and Self-regulation were effective theoretical frameworks for health behaviour change interventions for people with type 2 diabetes. All of the models or programmes identified in this systematic review had some theoretical basis in Social Learning Theory and/or Self-regulation. Motivational Interviewing was the most effective intervention at improving some of the target behaviours. Some of the target behaviours also demonstrated improvement following interventions that were not based on a health behaviour change theory.

Increased physical activity and increased self-efficacy were the target behaviours that responded most clearly to health behaviour change interventions. For further details on individual outcomes refer to Appendix 27.

Systematic reviews of diabetes health behaviour change interventions rarely discussed the theoretical framework behind the interventions. Cochran (2008) and Heinrich (2010) were among those that did report the theories of their included studies.[24, 28] Some of the systematic reviews included study designs other than the gold standard randomised controlled trials, such as comparison studies[28] and pilot studies.[24] The systematic reviews were also limited by lack of definitions, in particular of ‘usual care’. It was difficult to distinguish education only interventions from self-management interventions. The systematic reviews also contain indirect interventions with inclusion of type 1 and 2 diabetes, and adults and children.[24]

The results of the randomised controlled trials, whether they were based on theory alone or part of a theoretically-based health behaviour change programme or model, or had no theoretical base were very similar in that benefits were sometimes reported even in the absence of a clearly defined theoretical framework.

The interventions were generally delivered by health professionals who had undergone additional training or by peers who had also undergone specific training relevant to delivery of the intervention and support to the participants.

The evidence suggested that both individual and group interventions were effective but NZGG notes that implementation of such interventions may be subject to financial constraints, which were not fully explored in the trials and systematic reviews included in this report.

It is difficult to establish what the essential components of an effective health behaviour change intervention might be from the evidence identified in this review.

Health behaviour change interventions for type 2 diabetes did not seem to be effective at improving clinical outcomes when compared with control groups; however, they did seem to be superior at improving the individuals perception of control of their disease, which is important because perception of control is associated with a self-belief that changes can be made. The evidence is limited by the relatively short duration of interventions and short duration of follow-up, and lack of reinforcement to ensure continued attention to goal setting and compliance.

4.5 Additional material discovered of interest for diabetes

A recent report for The Ministry of Health by NZGG (2010) is an additional useful source of reference. The report was entitled 'Management of Type 2 Diabetes – Evidence Summary for Four Priority Areas'.

The report includes a summary of:

- Scottish Intercollegiate Guideline Network (SIGN) guideline (2010)
- the National Health and Medical Research Council (NHMRC) guidance (2009);
- four systematic reviews
- criteria for high quality education programmes as identified by the Patient Education Working Group (UK)
- Diabetes Self-Management Education Standards proposed by the International Diabetes Federation.

5 Chronic obstructive pulmonary disease (COPD) health behaviour change interventions

Summary for people with COPD

Interventions based on single or multiple health behaviour change theories
Behavioural change interventions, for people with COPD, that are based on Cognitive Behavioural Theory/Therapy are most effective at improving some of the target behaviours examined in this systematic review.

Programmes or models based on single or multiple health behaviour change theories
Motivational Interviewing, which is based on multiple behavioural change theories, and the Chronic Care Model, which is based on Social Learning Theory, were also effective at improving some of the target behaviours examined in this systematic review.

Interventions with no evidence of a theoretical framework based on health behaviour change theory
Interventions with no evidence of a theoretical framework were also effective at improving some of the target behaviours.

The behavioural change interventions examined in this review were most effective for increasing physical activity, improving quality of life, improving medication adherence and reducing health resource use.

Summary of health behaviour change interventions for people with chronic obstructive pulmonary disease

	Increased physical activity	Decreased depression	Improved quality of life	Increased self-efficacy	Self-monitoring/ clinical outcomes	Medication adherence	Decreased health resource use
Cognitive Behavioural Therapy/Theory	+	+	+	NR	NR	NR	=
Motivational Interviewing	+	=	+	=	=	+	?
Chronic Care Model	+	NR	?	NR	=	+	+
No theoretical framework	+	?	?	=	+	+	+

NR not reported; + evidence suggests a benefit for self-management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

There was no published evidence identified regarding the effectiveness of health behaviour interventions for the outcomes of improving diet and managing weight or management of blood pressure.

Chronic Obstructive Airways Disease (COPD) refers to a cluster of chronic lung disorders for which the restricted airflow associated with them is not reversible. The most common forms of COPD are emphysema and bronchitis. The associated symptoms of increased coughing and breathlessness when exercising or walking are permanent. The main risk factor is smoking.[18] The disease is characterised by exacerbations which are episodes of worsening symptoms that may require additional treatment with steroids and antibiotics, oxygen therapy or even hospitalisation. One in 15 adults over the age of 45 had reported a diagnosis of COPD and women over 45 years were more likely to receive a diagnosis of COPD than men ($p<0.05$). After adjusting for age, Māori men aged 45 years or older had twice the prevalence than for all men aged 45 years or older. Māori women also had an increased prevalence, and Asian men and women had a much lower risk of being diagnosed with COPD than the total population.[18] The prevalence of COPD is linked to living in areas of deprivation and is nearly three times higher for women residing in areas of high deprivation compared with women living in areas of low deprivation.[18] The same effect is not observed for men.

The aim of this chapter is to establish the effectiveness of health behaviour change interventions in changing specific target behaviours in patients with COPD. The target behaviours are physical activity, dietary behaviours and weight management, depression, quality of life, self-efficacy, self-monitoring, blood pressure, medication adherence and health resource use.

The chapter also provides information on which comprehensive chronic care programmes (a commonly used type of health behaviour intervention) are clearly based on theories of health behaviour change and how effective each programme is in relation to improving outcomes for people with COPD.

5.1 Body of evidence

5.1.1 Systematic reviews

Nine systematic reviews were identified that reported on health behaviour change interventions in people with COPD (refer to Supplementary Material B for RapidE Chronic Care Systematic Review at www.nzgg.org.nz for further details of these studies):

- six were considered to be of good quality[67-72]
- three were considered to be of mixed quality.[73-75]

Only two of thesystematic reviews reported the theoretical framework behind the included studies. Both Adams (2007) and Peytremann-Bridevaux (2008) reported on studies using the Chronic Care Model.[67, 68]

5.1.2 Randomised controlled trials

Fifteen randomised controlled trials reported in 16 papers were identified that described health behaviour change interventions in people with COPD (refer to Evidence Tables in Supplementary Material A at www.nzgg.org.nz for details of these studies). Participants were mostly elderly (mean reported age ranged from 62 to 74 years) and the majority were male. Mean severity of COPD varied from 31% to 67% in Forced Expiratory Volume (FEV1 predicted) at one year.[76] FEV1 is the maximum amount of air that can be forcibly exhaled in one second. FEV1 >80% of predicted is considered normal, whilst an FEV1 of <40% would be considered as severe obstruction. The ethnicity of participants was rarely reported. For further details of participant demographics refer to Appendix 7.

Six trials were undertaken in the USA,[77-80 81, 82] two in the Netherlands[83, 84] and Spain,[85, 86] and one each in New Zealand, [87] Australia,[88] Turkey,[89] Canada,[90] United Kingdom[76] and Sweden.[91]

- Seven trials were considered to be of good quality (low risk of bias).[76-78, 82, 84, 85, 90]
- Seven trials were considered to be of mixed quality (unclear risk of bias).[83, 86-89, 91]
- Three trials were considered to be of poor quality (high risk of bias).[79-81]

Overall the trials were of mixed quality with inadequate reporting of allocation concealment techniques, a lack of blinding and inadequate reporting of attrition. Refer to Appendix 8 for a summary of the quality (and risk of bias) for these randomised controlled trials. Appendix 9 provides further details on the duration of interventions and who delivered them. Details of the individual components of the randomised controlled trials can be referred to in Appendix 10.

5.2 Summary of findings

5.2.1 Increasing levels of physical activity in people with COPD

5.2.1.1 Interventions based on single or multiple health behaviour change theories

Kunik (2008) reported that the 6 minute walking test improved for both intervention (Cognitive Behavioural Theory/Therapy) and control groups from start to the end of treatment (8 weeks). However, there were no significant differences between the intervention and control groups indicating the intervention was no more effective than the control.[81] The 6 minutes walk test is a self-paced assessment of submaximal exercise conducted by measuring the distance walked on a flat surface in 6 minutes.

5.2.1.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

There was a significant increase in the mean number of steps per day in a Motivational Interviewing intervention (+11%) compared with usual care (-18%), p=0.01. However, the sample size in this study is small (n=39) and as a result the study is likely to be underpowered to detect any significant differences.[83] The intervention used targeted exercise therapy in addition to a counselling strategy to promote physical activity[83] and is based on a combination of theories including Social Learning Theory, Self-regulation, Transtheoretical Model and Theory of Reasoned Action.

In a systematic review of interventions within the Chronic Care Model (based on Social Learning Theory), Peytremann-Bridevaux (2008) reported on significantly increased exercise capacity in the intervention groups.[67]

The evidence suggests there is a benefit for improving physical activity outcomes in people with COPD following Programmes or Models based on health behaviour change theories.

5.2.1.3 Behaviour Change Interventions with no evidence of a theoretical framework based on health behaviour change theory

Wood-Baker (2006) found no evidence to support the use of action plans to increase physical activity compared with education alone in patients with chronic obstructive airways disease.[88]

Berry (2010) compared a combined self-management, exercise and education programme with an exercise and education programme. There was no evidence of a significant difference between intervention and control groups for physical activity level, physical function or exercise capacity.[78]

A pulmonary rehabilitation intervention (refer to section 3.4 Behaviour Change Interventions for further details on this intervention) that included behavioural change strategies increased exercise capacity, as measured by walking distance at 8 and 12 weeks ($p<0.05$) compared with a control group.[89] However, although the twelve week difference remained significant between groups the evidence suggested a deterioration in exercise capacity over time suggesting that reinforcement may be required to maintain benefits. In another rehabilitation intervention there was no evidence of group differences at 20 weeks and one year follow-up in relation to daily activity.[79] At 20 weeks the 6 minute walk test was significantly different between groups in favour of the pulmonary rehabilitation group (p=0.02). However, these differences were no longer evident at one year.[79]

Norweg (2005) detailed the results of a 3-armed trial that compared exercise training and activity (behavioural) training with exercise and didactic education or education alone. Exercise tolerance did improve in all groups across the trial; however, there

were no between-group differences in exercise tolerance indicating that the interventions had no benefit over the control group.[80]

Two systematic reviews reported a benefit for health behavioural change interventions. Lacasse (2009) reported on significantly increased exercise capacity in the intervention groups.[70] Puhan (2011) reported a significant benefit for pulmonary rehabilitation in high risk COPD patients (those recently hospitalised for acute exacerbations) compared with usual care ($p<0.02$); however, statistical heterogeneity was 93%.[71] This high level of heterogeneity suggests that the trials included in the systematic review may have differed from each other, this could be in the severity of the disease or the type of study included for example. Because of this the results must be interpreted with caution.

In contrast to the two previous systematic reviews reported, Effing (2007) identified no significant differences between intervention and control groups.[69] Nor were there any significant differences in exercise tolerance identified by Blackstock (2007).[73]

The overall effectiveness of self-management interventions on exercise/physical activity outcomes for people with COPD is difficult to determine due to the multiple and diverse outcome measures that are reported. Behavioural change interventions, even in the absence of a theoretical framework appear to be effective in increasing exercise capacity and walking distance. Pulmonary rehabilitation appears to improve exercise capacity in the short term, although it is not clear whether the beneficial effects are maintained. Action plans alone have no effect on physical activity.

5.2.2 Improving diet and managing weight in people with COPD

No evidence was identified from systematic reviews or randomised controlled trials for the outcomes of dietary behaviours or weight management following health behaviour change interventions in people with COPD.

5.2.3 Improving depression in people with COPD

5.2.3.1 Interventions based on single or multiple health behaviour change theories

Two trials based on Cognitive Behavioural Theory/Therapy, in COPD patients diagnosed with clinical depression, found that interventions improved depressive symptoms. The benefits were maintained after the intervention was completed, in one trial at 12 months and in the other at 9 months follow-up.[81, 84] The intervention was most effective for patients with moderate to severe depression.[81] Both intervention and control groups showed an improvement in the course of the trial ($p<0.005$); however, there were no significant differences between the control and intervention groups.[81]

Cognitive Behavioural Therapy as an intervention based directly on Cognitive Behavioural Theory was effective at improving depressive symptoms.

5.2.3.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

No significant differences in depression outcomes were identified between Motivational Interviewing and usual care.[83]

5.2.3.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

There were no significant differences between action plans and usual care for scores on the Hospital Anxiety and Depression questionnaire.[87]

One systematic review reporting on pulmonary rehabilitation (refer to section 3.4 Health Behaviour Change Interventions for further details) was identified.[74] Programmes that included up to three sessions per week of supervised exercise and educational and psychosocial support significantly (p=0.001) reduced depression compared with standard care.[74]

Overall, there was no evidence that action plans reduced depressive symptoms compared with usual care. Pulmonary rehabilitation appeared to be effective at reducing symptoms of depression in COPD patients.

5.2.4 Improving quality of life in people with COPD

5.2.4.1 Interventions based on single or multiple health behaviour change theories

Two trials were identified that had used Cognitive Behavioural Theory/Therapy.[81, 84] Both reported positive effects on quality of life scores. Kunik (2008) reported significant improvements in both physical and mental composite scores in both Cognitive Behavioural Therapy (p<0.0001) and education alone group (p<0.007); however, there were no differences between the intervention and control group. Lamers (2010) found that the intervention group had significantly better quality of life scores at all follow-up points including at 9 months (p=0.004).[84]

5.2.4.2 Behaviour Change Programmes or Models (including adaptations) based on single or multiple health behaviour change theories

Four trials were identified that had used Motivational Interviewing as an intervention. This is based on multiple behavioural change theories including Social Learning Theory, Transtheoretical Model, Theory of Reasoned Action and Self-regulation. Hospes (2009) observed a significant improvement in quality of life in the Motivational Interviewing group compared with usual care (p=0.05). However, the sample size was small (n=39) and the trial is therefore likely to be underpowered to detect significant differences, and the results should be interpreted with caution.[83]

Khdour (2009) also used Motivational Interviewing in an intervention led by a pharmacist.[76] There was significant improvement in both symptom (p=0.01) and impact (p=0.04) domains in the intervention group compared with the usual care group. The significant differences were sustained at 12 months follow-up.[76] In another trial using Motivational Interviewing a significant improvement in quality of life was observed in the intervention group compared with the usual care group (p=0.0003).[91]

A significant difference was identified in the illness intrusiveness scale (a measure of the impact of illness on various domains of functioning) in the intervention group following a nurse-led Motivational Interviewing intervention compared with usual care (Difference -7, 95% CI -15 – -0.5, p value not reported).[82] There were no other significant differences between groups for health-related quality of life measures.[82]

One randomised controlled trial and two systematic reviews reported on quality of life outcomes following behavioural change interventions within the Chronic Care Model (based on Social Learning Theory). In the randomised controlled trial there were no significant differences in quality of life outcomes between the intervention and control groups.[86] One of the systematic reviews found moderate effects on quality of life [67] but another review which included a number of short-term studies failed to identify benefits for the Chronic Care Model.[68]

Overall, interventions using Motivational Interviewing were effective at improving quality of life outcomes in people with COPD.

5.2.4.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Actions plans as a health behaviour change intervention did not demonstrate increased effectiveness in improving quality of life compared with education alone.[72, 87, 88]

Berry (2010) found no evidence of a significant difference in quality of life between a non-theory based generic self-management plus exercise and education programme with an exercise and education programme (there was no comparator with no exercise).[78]

There was strong evidence that comprehensive pulmonary rehabilitation (a non-theory driven intervention) improves most aspects of quality of life, in particular, symptoms of dyspnoea (shortness of breath), fatigue, emotional functioning and activity involvement.[89] Steele (2008) found no differences in quality of life outcomes with a pulmonary rehabilitation intervention at 20 weeks follow-up.[79]

Norweg (2005) detailed the results of a 3-armed trial that compared exercise training and activity (behavioural) training with exercise and didactic education or education alone. The exercise and activity training resulted in a significant improvement in quality of life compared with exercise plus education ($p<0.05$).

Systematic reviews reported no evidence of improved health-related quality of life for didactic education interventions [69, 73] or for nurse-led interventions.[75] There was strong evidence that comprehensive pulmonary rehabilitation improved most aspects of quality of life, in particular symptoms of dysponea, fatigue, emotional functioning and activity involvement.[70, 71]

In sum, there is evidence that pulmonary rehabilitation improves quality of life in COPD patients as does Motivational Interviewing. Action plans alone do not have any effects on quality of life.

5.2.5 Improving self-efficacy/self-control/empowerment in people with COPD

5.2.5.1 Interventions based on single or multiple health behaviour change theories

No evidence identified.

5.2.5.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

There was no evidence of a benefit following Motivational Interviewing on self-efficacy outcomes compared with usual care. However, the sample size was small (n=39) and the trial is therefore likely to be underpowered to detect significant differences and the results should be interpreted with caution.[83]

5.2.5.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Steele (2008) found no differences in self-efficacy for walking following a pulmonary rehabilitation programme compared with a control group at 20 weeks follow-up.[79] No significant differences between groups were found by Norweg (2005) in a 3-armed trial that compared exercise training and activity (behavioural) training with exercise and didactic education or education alone.[80]

There was no evidence of an improvement in self-efficacy associated with self-management or didactic education as detailed in one trial in the systematic review reported by Blackstock (2007).[73]

In sum, there was no evidence to suggest an improvement in self-efficacy following any health behaviour change intervention for people with COPD.

5.2.6 Improving self-monitoring/clinical outcomes in people with COPD

There are a number of symptoms such as increased dyspnoea or decreased lung function that are important indicators of clinical status and may help early detection or prevention of exacerbations (instances of acute deterioration requiring additional medication and/or hospitalisation). Self-monitoring is not considered a key component of health behaviour change in COPD as it might be in diabetes, where monitoring of glucose levels can prevent numerous complications associated with the disease.

5.2.6.1 Interventions based on single or multiple health behaviour change theories

No evidence identified.

5.2.6.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

There were no significant differences between a Motivational Interviewing intervention and usual care in Forced Expiratory Volume (FEV1) (predicted) at one year.[76]

Peytremann-Bridevaux (2008) and Adams (2007) found no differences between intervention and control groups in lung function[67, 68] or improvements in symptoms [67] including dyspnoea (shortness of breath) in behavioural change interventions within the Chronic Care Model, which is based on Social Learning Theory.[68]

Lung function was not improved by health behaviour change interventions compared with control interventions.

5.2.6.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

There was no evidence to suggest that action plans were an effective intervention in improving lung function compared with education alone.[88] A description of action plans can be referred to in section 3.4 (Behaviour Change Interventions)

A pulmonary rehabilitation intervention was found to be effective at improving dyspnoea (shortness of breath) at 8 and 12 weeks;[89] however, the overall effectiveness was waning at 12 weeks, indicating that some additional reinforcement after the initial intervention may be beneficial. In another trial using a pulmonary rehabilitation intervention there were no significant differences between the control and intervention in symptom management at 20 weeks follow-up. A description of pulmonary rehabilitation can be referred to in section 3.4 (Behaviour Change Interventions)

Norweg (2005) detailed the results of a 3-armed trial that compared exercise training and activity (behavioural) training with exercise and didactic education or education alone. The combination of exercise and activity components resulted in less dyspnoea ($p \leq 0.04$) and fatigue ($p \leq 0.01$) in the short term compared with the other intervention groups.[80]

Three systematic reviews found no differences between intervention and control groups in lung function[69, 72, 75] or improvements in symptoms.[72]

There was no evidence to support the superiority of health behaviour change interventions over control interventions for improving clinical outcomes in people with COPD.

5.2.7 Improving medication adherence in people with COPD

5.2.7.1 Interventions based on single or multiple health behaviour change theories

No evidence identified.

5.2.7.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Motivational Interviewing led by a pharmacist was effective at increasing medication adherence at one year (77.8% compared with 60%; p=0.019).[76] Motivational Interviewing is based on multiple behaviour change theories that include Social Learning Theory, Self-regulation, Transtheoretical Model and Theory of Reasoned Action.

The Chronic Care Model is based on Social Learning Theory. There was a significant (p=0.009) increase in medication adherence for inhaled medication observed in behavioural change intervention with in the Chronic Care Model when compared with usual care (71% compared with 37%).[86]

Programmes and models based on health behaviour change theories were effective at improving medication adherence in people with COPD.

5.2.7.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Wood Baker (2006) compared the use of education with or without action plans and found that action plans were associated with a significant increase in the number of episodes of self-initiated treatments with oral antibiotics or corticosteroids for acute exacerbations of COPD.[88] However, McGeogh (2006) compared action plans with usual care and found greater knowledge but not increased use of medications.[87] In a systematic review, Walters (2010) reported on the statistically significant

effectiveness of action plans compared with usual care for the use of corticosteroids, treatment with antibiotics, recognition of a severe exacerbation and self-initiation of treatment in a severe exacerbation.[72]

In sum, the use of action plans is to encourage early intervention to promptly treat exacerbations, which are associated with faster decline in COPD patients. There is good evidence that action plans increase the likelihood of prompt treatment for exacerbations.

5.2.8 Reducing health resource use in people with COPD

Health resource use was measured by most of the included studies and included hospitalisation for acute episodes or exacerbations, emergency department visits, general practitioner visits and days spent in hospital.

5.2.8.1 Interventions based on single or multiple health behaviour change theories

In an intervention based on Cognitive Behavioural Theory/Therapy, Kunik (2008) reported no differences between intervention and control group in health service use.[81]

5.2.8.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Coultas (2005) reported on an intervention using Motivational Interviewing led by a pharmacist. The intervention was found to be effective at reducing emergency department visits (40 visits compared with 80 visits, p=0.02) and hospital admissions (26 compared with 64, p= 0.01) at one year, compared with usual care. A nurse-led intervention also using Motivational Interviewing found no significant differences between intervention and usual care groups for self-reported health care utilisation.[82] Casas (2006) utilised the Chronic Care Model.[85] There was a significant difference in re-hospitalisation rates in favour of the intervention group compared with usual care (HR 0.55, 95% CI 0.34 – 0.87, p=0.01).[85] The intervention group received educational material, health behaviour change strategies and a web interface.[85]

Two systematic reviews were identified that reported on trials using the Chronic Care Model (based on Social Learning Theory). Patients who received interventions with two or more components of the Chronic Care Model had lower rates of hospitalisation and emergency or unscheduled visits.[68] Peytremann-Bridevaux (2008) reported lower hospitalisation rates and out-patient visits in the intervention group in seven of 10 studies reporting this outcome. [67]

Overall, programmes and models based on health behaviour change theories show reduced use of health resources by people with COPD compared with the control intervention.

5.2.8.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

There was no statistical evidence of group differences in consultations, hospitalisations or emergency department attendance for action plans compared with education alone[88] or usual care.[87] Rice (2010) reported on an intervention that included an action plan and education compared with usual care. At one year the mean cumulative frequency of disease related hospitalisations and emergency department visits was significantly lower in the intervention group (mean difference 0.34, 95% CI 0.15 – 0.52, p<0.001). There was also a significant difference in the number of total hospital days (mean difference 1.1, 95% CI 0.2 – 2.0, p=0.03).[77]

The 'Living Well with COPD' intervention resulted in a statistically significant and clinically-relevant reduction in all-cause hospitalisations (treatment difference -26.9%) and in emergency department visits (treatment difference -21.1%) in favour of the intervention group at two years follow-up. No P values were given.[90]

Two systematic reviews were identified that did not report on the theoretical framework of the included trials. Effing (2007) reported decreased hospitalisation rates following a health behaviour change intervention and this was more pronounced for those who had a higher risk of an exacerbation.[69] Blackstock (2007) reported that education focusing on health behaviour change indicated a tendency to reduced health care resource use, but it did not reach statistical significance.[73]

Pulmonary rehabilitation (Further details can be referred to in section 3.4 Behaviour Change Interventions) in patients recently hospitalised for acute exacerbations of COPD significantly reduced new hospital admissions, with a Number Needed to Treat (NNT) of 4 (range 3–8) over 25 weeks.[71] However, a review of action plans versus usual care found no effects on hospitalisation despite evidence suggesting that the intervention group was more likely to initiate appropriate medication in a severe exacerbation.[72]

Taylor (2005) reported some evidence of a benefit in reduced emergency department visits and equivocal results for hospital readmissions and days spent in hospital. There was no evidence of a difference between groups for outpatient visits. There were no summary statistics or P values provided.[75]

In sum, there is good evidence that interventions which include self-driven health behaviour change components appear to reduce health care resource use in COPD patients. There is insufficient information about the particular features of the programmes that reduce resource use to draw any more specific conclusions; however, action plans on their own do not influence resource use.

5.2.9 Managing blood pressure in people with COPD

No evidence was found that assessed the effects of interventions on blood pressure following a health behaviour change intervention in participants with COPD.

5.3 Limitations of trial evidence for people with COPD

The evidence identified in this systematic review should be interpreted in the context of a number of limitations. There was considerable variation (heterogeneity) between the included studies based on participants, interventions and outcomes for people with COPD. [69]

In general, the participants in the studies had moderate to severe stable COPD, although some studies, particularly those assessing the effects of exercise or Pulmonary Rehabilitation interventions, included a proportion of patients with mild disease. No stratification was undertaken according to disease severity in participants and it was therefore not possible to determine whether there were differential effects depending on the disease severity in subjects. Indirect populations were also reported in one trial for which 60 percent had a clinical diagnosis of depression.[81]

Interventions also varied and few studies were able to determine differential effects of different components of multifaceted interventions since many of the control groups had usual care, with few details describing what this constituted, usual care may have involved some type of health behaviour intervention. A limitation of the majority of the studies with regards to distinguishing the effects of interventions is the lack of participant blinding in the studies – participant blinding is when participants are not aware of which intervention or control group they are part of. Lack of blinding may not affect outcomes such as readmission to hospital or lung function but can cause substantial bias when participants make their own assessments of quality of life, exercise capacity, depression and adherence to medication. It was often difficult to separate out didactic education from health behaviour change interventions in some of the systematic reviews.[73]

Some of the trials were subject to a lack of generalisability and had high attrition rates[81, 86] or the number of participating centres was only one fifth of those invited, as reported by Wood-Baker (2006).[88] This means that there was a low uptake following invitation to participate. This could potentially result in a bias as the participant sample is less likely to be representative of all those invited and therefore the population with COPD at large.

5.4 Overall summary of health behaviour change interventions for people with COPD

The evidence identified in this systematic review indicated that people with COPD benefited from health behaviour change interventions based on Cognitive Behavioural Theory/Therapy.

Two of the programmes or models (Motivational Interviewing and the Chronic Care Model) that were identified had some basis in Social Learning Theory. Motivational Interviewing is also associated with other health behaviour change theories. Both of these interventions were effective at improving some of the target behaviours of this

systematic review. For people with COPD behavioural change interventions with no theoretical framework were also effective at improving some aspects of the target behaviours.

The health behaviour change interventions were most effective at improving physical activity, improving quality of life, improving medication adherence and reducing health service resource use for people with COPD. Further details on the effects on individual outcomes can be referred to in Appendix 27.

Systematic review and randomised trial evidence of COPD health behaviour interventions rarely discussed or reported the theoretical framework behind the interventions. The emphasis of the interventions seemed to be focusing on, and dealing with, an irreversible chronic disease and early identification and treatment of exacerbations.

A variety of programmes were identified in trials of COPD patients. Some of these programmes included only a small component of health behaviour change interventions (or self-management) in a wide multi-faceted approach that may have included education, which makes it difficult to determine which components influenced the identified effects. Interventions could be categorised as follows:

- pulmonary rehabilitation (PR): a non-theory driven programme that generally combines interventions of the respiratory system (eg, smoking cessation, medications), psychological support (eg. patient education, psychological and social support, which includes counselling) and physical exercise
- written action plans (not theory driven)
- exercise counselling and encouragement (possibly theory driven)
- multi-faceted more complex programs with a number and variety of components some of which may be theory driven.

The overall evidence suggests that some of the target outcomes appeared to benefit from health behaviour change interventions, whilst others showed no evidence of superiority over usual care or alternative control intervention.

In health behaviour change interventions for people with COPD the long-term benefit is not determinable, whether they be theoretically driven or not. This again is probably a reflection of the disease process itself. The medical management of this disease focuses on maintenance and avoidance of deterioration rather than improvement. As with health behaviour change interventions in other chronic diseases there was a lack of reinforcement of behaviours after the initial programme had concluded.

Non-theory driven actions plans appeared to be beneficial compared with control interventions for improved medication adherence and health care utilisation. There was no evidence of a benefit for self-efficacy, or clinical outcome measures.

It is difficult to determine which components of the reviewed health behaviour change interventions may be essential or if it is a combination of components that are required to observe a benefit.

6 Asthma health behaviour change interventions

Summary for people with asthma

Interventions based on single or multiple health behaviour change theories
Behavioural change interventions, for people with asthma, that are based on Social Learning Theory or Self-regulation are most effective at improving some of the target behaviours examined in this systematic review.

Programmes or Models based on single or multiple health behaviour change theories
Both of the programmes or models that were identified had a theoretical framework that included aspects of Social Learning Theory or Self-regulation. Motivational Interviewing was an effective intervention for improving some of the target behaviours examined in this systemic review, specifically, improving quality of life, improving self-monitoring/clinical outcomes, increasing medication adherence and decreasing aspects of health service resource use.

Interventions with no evidence of a theoretical framework based on health behaviour change theory
No theoretical framework was as effective as behavioural change interventions for some target behaviours in people with asthma.

Health behaviour change interventions were most effect at improving quality of life, improving medication adherence, and decreasing health resource use in people with asthma.

Summary of health behaviour change interventions for people with asthma

	Increased physical activity	Improved quality of life	Increased self-efficacy	Self-monitoring/clinical outcomes	Medication adherence	Decreased health resource use
Social Learning Theory (Self-efficacy)	NR	+	+	?	+	NR
Self-regulation	NR	=	=	NR	+	+
Motivational Interviewing	NR	+	NR	+	+	+
Flinders Programme	?	=	=	=	NR	NR
No theoretical framework	+	=	=	?	+	?

NR not reported; + evidence suggests a benefit for self-management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

No published evidence was identified in this systematic review for the effectiveness of health behaviour interventions for improving diet and managing weight, improving depression or managing blood pressure in people with asthma.

Asthma is an inflammatory disease of the airways. It results in periodic (reversible) attacks of wheezing and breathlessness and coughing. Most attacks are transient and followed by complete recovery. Attacks can be triggered or exacerbated by allergens, respiratory infections, exercise, cold air, tobacco smoke and other pollutants.[18] In The New Zealand Health Survey (2008) it was reported than one in nine adults had a diagnosis of asthma and women were more likely to be taking medication than men. After adjusting for age Māori women were 40 percent more likely to be taking medication than women in the total population. Women in areas of high deprivation were more likely to be taking medication than women in areas of low deprivation.[18]

The aim of this chapter is to establish the effectiveness of health behaviour change interventions for changing specific target behaviours in patients with asthma. The target behaviours are physical activity, dietary behaviours and weight management, depression, quality of life, self-efficacy, self-monitoring, blood pressure, medication adherence and health resource use. The chapter also provides information on which comprehensive chronic care programmes (a commonly used type of health behaviour intervention) are clearly based on theories of health behaviour change and how effective each programme is in relation to improving outcomes for people with asthma.

6.1 Body of evidence

6.1.1 Systematic reviews

Four systematic reviews were identified which examined the effectiveness of health behaviour interventions for people with asthma (refer to Supplementary Material C for RapidE Chronic Care Systematic Review at www.nzgg.org.nz for further details):

- one was considered to be of high quality[92]
- two were considered to be of mixed quality.[1, 93, 94]

All the systematic reviews were mostly well-designed and conducted. There was little information included about the theoretical framework of the included studies in three of the reviews.[1, 93, 94] However Smith et al (2007) reported detailed information about the interventions including theoretical framework (where reported), which were referred to as psychoeducational.[92]

6.1.2 Randomised controlled trials

Thirteen scientific papers reporting on 11 randomised controlled trials were identified which examined the effectiveness of health behaviour change interventions in people with asthma (refer to Supplementary Material C for RapidE Chronic Care Systematic Review at www.nzgg.org.nz for further details). The reported mean age of participants ranged between 36.5 years and 48.5 years with the duration of asthma being between 15 years and 25 years on average. There appeared to be wide variations (heterogeneity) in the severity of asthma among included participants with

studies ranging from 22% to 100% of patients with moderate to severe persistent asthma where this was reported (refer to Appendix 11 for further details). Most studies had a higher proportion of females than males.

Five of the trials were based in the USA,[95-100] with the remaining trials based in the Sudan,[101] the Netherlands,[102-104] France,[105] Serbia,[106] Australia[107] and China.[108]

- Two trials (three papers) were considered to be of high quality (low risk of bias).[95, 96, 98]
- Nine trials (ten papers) were considered to be of mixed quality (unclear risk of bias).[97, 99-104, 106-108]
- One trial was considered to be of low quality (high risk of bias).[105]

Overall, the trials were of mixed quality with inadequate reporting of randomisation and allocation concealment techniques, a lack of blinding and inadequate reporting of attrition. Refer to Appendix 12 for a summary of the quality (and risk of bias) for these randomised controlled trials. Appendix 13 provides further details on the duration of interventions and who delivered them. Details of the individual components of the randomised controlled trials can be referred to in Appendix 14.

6.2 Summary of findings

6.2.1 Increasing levels of physical activity in people with asthma

6.2.1.1 Interventions based on single or multiple health behaviour change theories

No evidence identified.

6.2.1.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Rowett (2005) reported improved performance in the 6 minute walk test following the Flinders Program™ (incorporating Cognitive Behavioural Therapy and problem solving and Motivational Interviewing) whilst no improvement was observed in the control group. The 6 minute walk test is a self-paced assessment of submaximal exercise conducted by measuring the distance walked on a flat surface in 6 minutes. There were no statistical differences between the intervention and control groups.[107]

6.2.1.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

One systematic review (Shaw, 2006) was identified but it did not identify the theoretical framework of the included trials. None of the included studies assessed participation in physical activity. The intervention programmes did result in a clinically significant improvement (>50 m) in the 6 minute walk test at 6 months and further improvement at 12 months. No differences were observed in the control group. However, Shaw (2006) did not report the statistical differences between the intervention and control groups.[1]

6.2.2 Improving diet and managing weight in people with asthma

There was no evidence identified from the health behaviour change interventions for the outcome of improving diet and managing weight in people with asthma.

6.2.3 Improving depression in people with asthma

There was no evidence identified from the health behaviour change interventions for the outcome of improving depression in people with asthma.

6.2.4 Improving quality of life in people with asthma

6.2.4.1 Interventions based on single or multiple health behaviour change theories

Four trials reported on interventions based on self-efficacy (Social Learning Theory). Janson (2009) reported no significant differences between intervention and control groups in quality of life outcomes.[97] However, a non-significant trend for an improvement in the intervention group was observed. van der Meer (2009; 2010) reported the absolute difference in quality of life scores between groups and the absolute improvement for intervention patients was small, and it was difficult to ascertain whether this difference was therapeutically meaningful.[103, 104] Mancuso (2010) found that improvements identified following a Social Learning Theory (self-efficacy) based intervention did not persist when longer-term, two-year follow-up data was analysed.

There was no evidence of a significant difference following a Self-regulation Theory based intervention.[102] However, a non-significant trend for an improvement in the intervention group was observed.

A systematic review that had included studies using psychoeducational interventions reported no differences in quality of life outcomes between intervention and control groups.[92]

Interventions using Social Learning Theory as a framework seem to be effective at improving quality of life.

6.2.4.2 Programmes or models (including adaptations) based on single or multiple health behaviour change theories

Wilson (2010) reported a significant, but small, benefit in improved quality of life in the intervention compared with the control group following Motivational Interviewing.[100] Motivational Interviewing is congruent with multiple behavioural change theories including Social Learning Theory, Self-regulation, the Transtheoretical Model and the Theory of Reasoned Action.

Rowett (2005) reported no significant differences between intervention and control groups for quality of life measures following the Flinders Program™ (incorporating Cognitive Behavioural Therapy and problem solving and Motivational Interviewing).

The programmes and models based on health behaviour change theory identified in this systematic review were not effective overall at improving quality of life in people with asthma.

6.2.4.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Three systematic reviews were identified that did not elaborate on the theoretical frameworks of the included interventions. They did not identify any statistical differences between the intervention and control groups for quality of life outcomes.[1, 93, 94]

6.2.5 Improving self-efficacy/self-control/empowerment in people with asthma

6.2.5.1 Interventions based on single or multiple health behaviour change theories

Three trials reported on interventions based on Social Learning Theory. Janson reported significant increases in perceived asthma control at 6 months follow-up for the intervention group ($p<0.01$). [97] van der Meer (2009, 2010) reported that the intervention group receiving a self-efficacy based intervention showed significant improvements in perceived control of asthma. The difference between intervention and control group was only sustained in the short term and did not persist beyond three months.[103, 104]

Kuijer (2007) reported no significant differences between intervention and control groups in pre-test and post-test disease-specific self-efficacy scores following an intervention based on Self-regulation.[102]

Overall, Social Learning Theory was effective at improving self-efficacy outcomes in people with asthma.

6.2.5.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Rowett (2005) reported no differences between intervention and control groups following the Flinders Program™ (incorporating Cognitive Behavioural Therapy, problem solving and Motivational Interviewing) for self-efficacy outcomes.[107]

6.2.5.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Shackelford (2009) reported no significant differences between intervention and control groups at four weeks follow-up using the Asthma Control Test (a self-administered test that assesses how well the patient currently controls their asthma) that included a subscale of perceived asthma control.[99]

In a systematic review, Shaw (2006) reported on improvements in self-efficacy in only three of the 21 trials reporting on health behaviour interventions in people with asthma.

Overall, there was no evidence to support the effectiveness of health behaviour change interventions with no evidence of a theoretical framework, for self-efficacy outcomes.

6.2.6 Improving self-monitoring/clinical outcomes in people with asthma

6.2.6.1 Interventions based on single or multiple health behaviour change theories

Three trials reported on interventions based on Social Learning Theory. Janson (2009) reported no significant differences in lung function between the intervention and control groups.[97] van der Meer (2009, 2010) reported significantly increased symptom free days compared to the control group.[103, 104] In a well-designed trial investigating the effectiveness of an internet-delivered programme based on self-efficacy, van der Meer (2009; 2010) reported significant improvement in FEV1 for the internet group compared with usual care (mean difference 0.25, 95% CI 0.03 – 0.46, $p<0.05$).

In an intervention based on Self-regulation Theory, Clark (2007, 2010) did not identify any significant differences between the intervention and control groups in clinical symptoms experienced.[95, 109]

Overall, there was no evidence of a benefit in improving self-monitoring for interventions based on health behaviour change theory compared with a control group.

6.2.6.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Wilson (2010) reported improvements in lung function for the intervention group compared with usual care at one year follow-up. The intervention had a component that included including Motivational Interviewing. The adjusted mean percentage predicted FEV1 for the shared decision-making and usual care groups was 76.5% and 73.1%, respectively.[100]

Rowett (2005) reported no differences between intervention and control groups following the Flinders Program™ (incorporating Cognitive Behavioural Therapy and problem solving and Motivational Interviewing) for clinical outcomes.[107]

The overall evidence was mixed in relation to improving clinical outcomes for people with asthma, with one trial demonstrating a benefit and one reporting no differences between intervention and control groups.

6.2.6.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

There were no significant differences in lung function reported in the two trials that did not report a theoretical framework behind the behavioural intervention. [99, 106]

Two other trials reported benefits. Magar (2005) reported significantly increased symptom-free days in the health behaviour change intervention group[105] and Milenkovic (2007) reported significantly fewer exacerbations.[106]

Two systematic reviews reported on the impact of health behaviour interventions on lung function analyses. Tapp reported no significant difference in lung function scores[94] while Powell and Gibson reported a trend for improved FEV1 scores and a significant difference in favour of self-management groups for PEF (peak expiratory flow) scores (SMD 0.16, 95% CI 0.01 – 0.31).[93]

Shaw (2006) reported that there was a benefit in reduced self-reported symptoms, frequency of attacks or improved lung function in only nine of twenty studies reporting on these outcomes.[1]

6.2.7 Improving medication adherence in people with asthma

6.2.7.1 Interventions based on single or multiple health behaviour change theories

In trials based on Self-regulation Theory[95, 96] or self-efficacy based theories such as Social Learning Theory[97, 103, 104] there appeared to be a significant reduction in the use of additional medications and courses of oral corticosteroids, although there was little effect on the use of daily inhaled medication.

Smith (2007) was unable to report summary statistics due to wide clinical variations in the three trials which reported data. The systematic review did report a reduction of beta-agonist use and preventive medication, although this was limited to short-term effects.[92]

The evidence indicated that there was a benefit in improved medication adherence for people with asthma following a health behaviour change intervention compared with a control intervention.

6.2.7.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Motivational Interviewing appeared to be effective at reducing the need for rescue medication.[100] A rescue medication is a type of medication used by people with asthma to relieve asthma symptoms or to treat an asthma flare up. Motivational Interviewing is congruent with multiple behavioural change theories including Social Learning Theory, Self-regulation, the Transtheoretical Model and the Theory of Reasoned Action.

6.2.7.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Two trials using problem solving methods,[101, 105] and one other trial[106] that did not detail the theoretical framework of the intervention, also reported improvement in reduced use of additional medication following self-management interventions. A systematic review conducted by Powell (2009) reported that one study showed a reduction in courses of corticosteroids for intervention patients.[93]

6.2.8 Reducing health resource use in people with asthma

Definitions of health service resource use included hospitalisations, emergency department and general practitioner visits

6.2.8.1 Interventions based on single or multiple health behaviour change theories

Clark (2007; 2010) reported significantly fewer scheduled general practitioner visits in favour of the intervention group (Self-regulation) using a problem-solving based intervention. There were no other differences in health resource use.

6.2.8.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Wilson et al (2010) reported significantly fewer asthma-related hospital visits for their two intervention arms (one arm of which involved a shared decision-making and Motivational Interviewing approach to developing action plans with patients) compared with controls.[100]

For adults with severe or difficult asthma, Smith (2007) reported lower odds of hospitalisation but no significant difference in relative risk of hospitalisation (OR=0.70, 95% CI 0.49 – 0.99) for those patients receiving psychoeducational interventions compared with controls.[92]

Programmes or Models based on health behaviour change theory were effective at reducing health resource use compared with control groups in people with asthma.

6.2.8.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Milenkovic (2007) reported fewer emergency department, general practitioner and specialist visits for intervention patients at 12-months follow-up. These findings were based on patient self-report and were not checked against medical records. The differences were small – the intervention group reduced health resource use by less than one visit per year while the control group did not change.[106]

Three systematic reviews were identified that did not describe the theoretical framework of included interventions. Tapp (2010) reported some reduction in the relative risk (RR) of hospitalisations (RR 0.5 95% CI 0.27 – 0.91), but there was no difference in emergency department presentations.[94] Powell and Gibson (2009) reported no significant difference in hospitalisations, emergency presentations or unscheduled doctors visits.[93] Shaw (2006) reported a benefit in decreased health service utilisation in only seven of fifteen trials reporting this outcome following self-management interventions.

Some aspects of health resource usage were reduced in people with asthma following health behaviour change interventions that did not have a theoretical base. This was compared with control or usual care interventions.

6.2.9 Managing blood pressure in people with asthma

No evidence was identified that was associated with this outcome following health behaviour change interventions in people with asthma.

6.3 Limitations of trial evidence for people with asthma

Overall, the quality of the studies reviewed was mixed. Methods of recruitment and selection of participants were particularly poor with a very high rate of initial refusal in many studies and a high likelihood of selection bias. Selection bias occurs when the sample that is randomised is not representative of all potential participants. This can occur when participants are recruited through invitation methods, or by media campaigns. These methods tend to attract more females and more educated participants. Attrition from the studies was also relatively high, around 20% to 40% of patients withdrew from studies, and intention-to-treat analyses were not always completed. Interventions were not well-reported, particularly poorly described was whether there were efforts to standardise intervention protocols across different facilitators or practitioners. Blinding of participants or outcome assessors was not always undertaken. Some of the outcome measures were based on recall and therefore subject to the participants memory of an event.

6.4 Overall findings of health behaviour change interventions for people with asthma

This systematic review found that the most effective health behaviour change interventions, for people with asthma, were those based on Social Learning Theory or Self-regulation Theory. Both of the programmes or models of behavioural change that were identified in this review included aspects of Social Learning Theory and Self-regulation Theory. Motivational Interviewing was found to be an effective health behaviour change intervention for improving some of the target behaviours investigated in this systematic review. Specifically, there were improvements in self-monitoring/clinical outcomes, increasing medication adherence and decreasing aspects of health service resource usage. Further details on the effects on individual outcomes can be referred to in Appendix 27.

An interesting finding of note was that in people with asthma, interventions with evidence not clearly based on any health behaviour change theory demonstrated benefits in regards to some target behaviours, including increased physical activity and medication adherence.

All studies reported some positive effects as the results of behavioural change interventions, but there was not a great deal of consistency in outcomes or the way outcomes were measured across studies. There was little evidence of significant changes in lung function, with only one well-conducted trial indicating an improvement in FEV1 for the intervention group. There was no evidence of improvements in psychosocial outcomes, although this was measured using several different methods and so a single replicated measure of psychosocial outcomes was not obtained.

There was some systematic review evidence of a reduction in hospitalisations, with the studies reporting reduced odds of hospital visits but no change in emergency presentations for those patients with asthma in intervention groups.

There was fairly consistent evidence of a reduction in asthma-related symptoms for studies where problem-solving models had been used, although there was heterogeneity in the way problem solving this was measured. One systematic review showed no significant difference when only psychoeducational models were included, while another systematic review reported some evidence of reduced sickness days with optimised self-management programmes (those involving multiple components including self-monitoring, written action plans and regular review).

There was fairly consistent evidence of a reduction in additional medication use with problem-solving and self-efficacy models; however, there was little consistency in the way this was measured, with some studies relying on patient self-report and others clinical records. Additional medication was required as an adjunct to maintenance medication and to prevent or treat asthmatic attacks. A systematic review of psychoeducational models reported short-term, positive effects regarding medication use.

Quality of life appeared to improve in most of the randomised controlled trials. One systematic review of psychoeducational models indicating a trend towards improvement in quality of life for patients who took part in the intervention programme.

There was some evidence of improvements in self-monitoring for patients who participated in psychoeducational programmes, which included short- and medium-term clinical benefit for patients using action plans, and the early recognition and management of asthma attacks. There was however, little evidence of long-term benefit.

Unfortunately, the theoretical framework behind studies was often poorly described. Differences in the components of the interventions and the way they were operationalised limited the ability to identify the effective components of an intervention. However, there was some evidence that there was a benefit with regards to rates of hospitalisation, use of additional medications and symptoms where studies had incorporated a problem-solving or a self-efficacy model. In these studies there was an emphasis on self-monitoring of medications and symptoms, skills practice and goal-setting utilising a written individualised action plan.

Smith (2007) concluded that there was little clear, consistent evidence, study size and quality was often poor, and where positive effects were present, they were limited to the short- to medium-term and did not include patients with multiple complicating factors. The best evidence regarding psychoeducational models, defined as utilising psychological, psychosocial, educational, self-management or multi-faceted interventions and an interactive approach, came from a systematic review including only patients with severe or difficult asthma.[92]

6.5 Additional material discovered of interest including guidelines for people with asthma

Two guidelines including recommendations on self-management in asthma were identified and appraised using the AGREE II tool. They were classified as high quality (ie. 'Strongly Recommended').[110, 111] However, neither guideline included any reference to theoretical frameworks, or specific models or self-management programmes.

The SIGN (2009) guideline concluded that self-management interventions had been proven to be effective in improving health outcomes, particularly in those in secondary care with moderate to severe disease and for those with recent exacerbations. Specific improvements were observed in self-efficacy, knowledge and confidence. The guideline recommended that self-management education should focus on individual needs and be reinforced with written action plans.[110]

The Heart, Lung and Blood Institute (2007) guideline concluded that self-management education is essential to provide patients with the skills necessary to control asthma and improve outcomes.[111] Such education should be integrated into all aspects of asthma care and requires repetition and reinforcement. The guideline also recommends the use of personalised action plans. There is also a recommendation on the need for culturally-sensitive education.

7 Hypertension health behaviour change interventions

Summary for people with hypertension

Interventions based on single or multiple health behaviour change theories
The evidence suggests that self-management interventions for people with hypertension that are based on Cognitive Behavioural Theory or Social Learning Theory are the most effective at improving some of the target behaviours examined in this systematic review.

Programmes or Models based on single or multiple health behaviour change theories
All three of the Chronic Disease Self-Management Programmes or Models identified in this systematic review, for people with hypertension, had a theoretical framework based on Cognitive Behavioural Theory or Social Learning Theory. They were effective at improving some of the target behaviours examined in this systematic review.

Interventions with no evidence of a theoretical framework based on health behaviour change theory
Evidence based on no reporting of a theoretical framework was only identified for one target behaviour. A benefit was found compared with the control group.

Cognitive Behavioural Therapy, Motivational Interviewing, and the Chronic Care Model are the most effective health behaviour change interventions for improving some of the target behaviours examined in this systematic review. They were most effective for increasing physical activity, improving medication adherence and managing blood pressure.

Summary of health behaviour change interventions for people with hypertension

	Increased physical activity	Improved diet and managing weight	Improved quality of life	Increased self-efficacy	Medication adherence	Decreased health resource use	Managing blood pressure
Social Learning Theory + Stages of Change	+	NR	NR	+	NR	NR	+
Transtheoretical Model	NR	NR	NR	NR	+	=	=
Cognitive Behavioural Therapy/Theory	+	=	+	NR	NR	NR	+
Motivational Interviewing	=	+	NR	NR	NR	NR	+
Chronic Care Model	=	=	=	NR	+	NR	+
No theoretical framework	NR	NR	NR	NR	NR	NR	+

NR not reported; + evidence suggests a benefit for self-management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

There were no published health behaviour change intervention studies identified in relation to addressing depression, and self-monitoring/clinical outcomes for people with hypertension.

Hypertension is an important and often modifiable risk factor for heart disease, stroke and renal disease. Hypertension can be modified through increased physical activity, reducing obesity, dietary modifications including reducing sodium and alcohol intake. Hypertension is often symptomless and therefore the prevalence tends to be based on the proportion of the population prescribed anti-hypertensive medication. In The New Zealand Health Survey (2008) it was reported that one in seven adults indicated that they were taking anti-hypertensive medication, there were no gender differences in age standardised prevalence of taking medication. The use of these medications increased with increasing age and nearly half of adults aged 75 years or over were taking medication for high blood pressure. After adjusting for age, Asian men were almost 40% more likely to be taking medication than the Non-Asian population. Māori men and Māori and Pacific women were also more likely to be treated for hypertension.[18] There was no effect of deprivation on the use of medication for hypertension.

The aim of this chapter is to establish the effectiveness of health behaviour change interventions for changing specific target behaviours in patients with hypertension. The target behaviours are physical activity, dietary behaviours and weight management, depression, quality of life, self-efficacy, self-monitoring, blood pressure, medication adherence and health resource use.

The chapter also provides information on which comprehensive chronic care programmes (a commonly used type of health behaviour change intervention) are clearly based on theories of health behaviour change and how effective each programme is.

7.1 Body of evidence

7.1.1 Systematic reviews

One systematic review was identified that reported on health behaviour change interventions in people with hypertension (refer to Supplementary Material D for RapidE Chronic Care Systematic Review at www.nzgg.org.nz for further details).

- The review was considered to be of mixed quality.[22]

Chodosh (2005) reported data from 13 randomised controlled trials.[22] The review also included education only and self-monitoring only interventions and these were not separately reported in the analysis. There was no discussion of the theoretical framework underpinning the included trials.

7.1.2 Randomised controlled trials

Seven randomised controlled trials (9 papers) were identified that reported on health behaviour change interventions in people with hypertension (refer to Supplementary Material D for RapidE Chronic Care Systematic Review at www.nzgg.org.nz for further details). The average mean reported age ranged from 59.1 years to 71.3

years. The majority of participants had low levels of education. The duration of disease was not well described. For further details of participant demographics refer to Appendix 15. The majority of the trials were conducted in the USA.[112-117] The remainder were conducted in Taiwan,[118] China[119] and Australia.[120]

- Five trials (6 papers) were considered to be of good quality (low risk of bias).[112, 115-119]
- Two trials (3 papers) were considered to be of mixed quality (unclear risk of bias).[113, 114, 120]
- No trials were considered to be of low quality (high risk of bias).

Refer to Appendix 16 for a summary of the quality (risk of bias) of included trials. Appendix 17 provides further details of the duration of interventions and who delivered them. Details of the individual components of the randomised controlled trials can be referred to in Appendix 18.

7.2 Summary of findings

7.2.1 Increasing levels of physical activity in people with hypertension

7.2.1.1 Interventions based on single or multiple health behaviour change theories

More participants in the intervention group reported increases in their regular walking (not defined) compared with controls ($p<0.0005$) in an intervention based on self-efficacy (Social Learning Theory) and Stages of Change Theory.[118]

The intervention group in a Cognitive Behavioural intervention demonstrated a greater increase in physical activity per week than the control group ($p<0.001$).[119]

The limited evidence suggested a benefit in increased physical activity in the intervention groups compared with controls.

7.2.1.2 Behaviour change programmes or Mmodels (including adaptations) based on single or multiple health behaviour change theories

No differences between groups were identified in a 3-armed trial that compared self-monitoring of blood pressure with a web-based interface with or without the addition of pharmacist support, compared with usual care. This intervention was based on the Chronic Care Model (Social Learning Theory).[117]

Motivational Interviewing had no effect on participation in moderate to vigorous physical activity.[112] This intervention is based on multiple health behaviour change theories including Social Learning Theory, Transtheoretical Model, Self-regulation and the Theory of Reasoned Action

Programmes or models based on Social Learning Theory and/or multiple theories such as the Transtheoretical Model, Self-regulation and the Theory of Reasoned

Action did not seem to be effective in increasing physical activity in participants with hypertension.

7.2.1.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

7.2.2 Improving diet and managing weight in people with hypertension

7.2.2.1 Interventions based on single or multiple health behaviour change theories

Body Mass Index

Using a Cognitive Behavioural intervention, no significant differences were reported between the intervention and control groups for dietary behaviour.[119] There were significant differences in body mass index (BMI) at 4 months follow-up (mean difference 0.31, 95% CI 0.00 – 0.62, p=0.048) in favour of the intervention group.[119]

Cognitive Behavioural Theory was effective at reducing BMI compared with the control group.

7.2.2.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Body Mass Index

There were no differences in BMI between groups in a 3-armed trial that compared self-monitoring of blood pressure with a web-based interface with or without the addition of pharmacist support compared with usual care. This intervention was based on the Chronic Care Model (Social Learning Theory).[117]

Dietary Behaviour

The intervention group that received Motivational Interviewing showed an increased intake of fruit and vegetables and dairy products and decreased intake of total and saturated fat. The effects of increased dairy produce did not persist at 18 months although the other factors did persist.[112] Motivational Interviewing is congruent with multiple health behaviour change theories including Social Learning Theory, the Transtheoretical Model, Self-regulation and the Theory of Reasoned Action.

Body weight

The intervention group that received Motivational Interviewing led to a significant reduction in weight (p<0.0001); however, the effect did not persist at 18 months follow-up.[112] Motivational Interviewing is congruent with multiple health behaviour change theories including Social Learning Theory, the Transtheoretical Model, Self-regulation and the Theory of Reasoned Action.

The evidence remains equivocal with one intervention providing evidence of no effect within the Chronic Care Model and a Motivational Interviewing intervention suggesting a short-term benefit to the intervention group.

7.2.2.3 Behaviour Change Interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

7.2.3 Improving depression in people with hypertension

None of the included trials reported on the outcome of depression for participants with hypertension.

7.2.4 Improving quality of life in people with hypertension

7.2.4.1 Interventions based on single or multiple health behaviour change theories

A Cognitive Behavioural intervention had a significant improvement in health-related quality of life compared to the control group at 4 months follow up for physical (p=0.01) and mental (p=0.038) components.[119]

7.2.4.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

No differences were identified in health-related quality of life between groups in a 3-armed trial that compared self-monitoring of blood pressure with a web-based interface with or without the addition of pharmacist support compared with usual care. This intervention was based on the Chronic Care Model, which is based on Social Learning Theory.[117]

7.2.4.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

7.2.5 Improving self-efficacy/self-control/empowerment in people with hypertension

7.2.5.1 Interventions based on single or multiple health behaviour change theories

Lee (2007) reported a greater improvement in self-efficacy in the intervention group compared with controls. Self-efficacy for exercise was improved by a mean of 2.1 points compared with 0.8 points in the control group (p=0.001). The intervention was based on Social Learning Theory (self-efficacy) and Stages of Change theory.[118]

Burke (2008) reported on an intervention based on multiple theories (Health Belief Model, Theory of Planned Behaviour, Social Cognitive Theory). Self-efficacy for diet

and physical activity was significantly higher in the intervention group at the end of a cognitive lifestyle intervention (p=0.007 and p=0.001, respectively), but this was not sustained at one year follow-up.[120]

Both of the interventions reported above had components of Social Learning/Social Cognitive Theory and demonstrated benefits in increased self-efficacy. The benefit only appears to be in the short-term in the limited number of trials reporting this outcome.

7.2.5.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

No evidence identified.

7.2.5.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

7.2.6 Improving self-monitoring/clinical outcomes in people with hypertension

None of the included health behaviour change trials reported on outcomes of self-monitoring of blood pressure. For clinical outcomes refer to section 7.2.9 on Managing Blood Pressure.

7.2.7 Improving medication adherence in people with hypertension

7.2.7.1 Interventions based on single or multiple health behaviour change theories

Bosworth (2008) used an intervention based on the Health Decision Model and the Transtheoretical Model. The Health Decision Model combines the Health Belief Model (refer to section 3.2.1 for further details) and individual patient preferences. The intervention group had a 9% increase in self-reported medication adherence from baseline to 6 month follow-up while the increase in the control group was 1%. No P values were given.[113]

7.2.7.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

In a 3-armed trial that compared self-monitoring of blood pressure with a web-based interface with or without the addition of pharmacist support compared with usual care, the intervention group with pharmacist support were more likely to fill their medication prescription than the usual care group (p<0.001) or the intervention group

without pharmacist support (p<0.01). This intervention was based on the Chronic Care Model, which is based on Social Learning Theory.[117]

7.2.7.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

7.2.8 Reducing health service resource use in people with hypertension

7.2.8.1 Interventions based on single or multiple health behaviour change theories

Two trials reported on health service use following interventions based on multiple behavioural change theories that included the Transtheoretical Model. Neither trial found significant differences between groups in terms of health service resource use.[114, 115]

There was no evidence to suggest that health behaviour change interventions reduced health service use in participants with hypertension.

7.2.8.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

No evidence identified.

7.2.8.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

7.2.9 Managing blood pressure in people with hypertension

Blood pressure is a term that refers to the pressure exerted by blood on the walls of the blood vessels as it flows through them. Blood pressure is usually reported as two readings, the diastolic and the systolic. Systolic blood pressure is when the ventricles of the heart contracts pushing out blood from the heart into the arteries. Diastolic blood pressure occurs when blood pressure is rushing back to fill the heart ventricles. A normal systolic blood pressure would be in the range of 120–129 mm Hg and a normal diastolic blood pressure would be in the range of 80–84 mm Hg. High blood pressure is defined as blood pressure in the systolic range of 140–159 mm Hg and diastolic range of 90– 99 mm Hg.

7.2.9.1 Interventions based on single or multiple health behaviour change theories

Lee (2007) used an intervention that combined Social Learning Theory and Stages of Change Theory. A greater reduction in systolic blood pressure (SBP) was observed in the intervention group than the control group at 6 months follow-up (mean differences -7 mm Hg, p=0.002), this effect remained after adjusting for other variables. There were no statistical differences between intervention and control groups in diastolic blood pressure (DBP).[118]

In a Cognitive Behavioural intervention, the intervention but not the control group experienced a significant decrease in both systolic (p<0.001) and diastolic blood pressure (p<0.001) at one month and 4 months after the end of the intervention.[119]

Two trials (reported in four separate papers) by Bosworth[113-116] were based on multiple behavioural change theories that included the Transtheoretical Model. There were no significant differences in changes in blood pressure control in the intervention compared with the control groups. Although the tailored health behaviour change intervention group did report the largest change in blood pressure with a group, in those with adequate blood pressure control at the start of the trial this change was not significant. Systolic blood pressure improved over time within each group (p=0.003), but there were no differences between intervention and control groups. All of the intervention groups showed improvement in blood pressure control over time.[115, 116]

A combined intervention (health behaviour change intervention plus blood pressure monitoring) had the greatest increase in the proportion of patients with blood pressure control. At 24 months the adjusted improvement, compared with usual care, was 11% (p=0.012) for the combined group; 4.3% (Not Significant [NS]) for the behavioural intervention alone group and 7.6% in the home blood pressure monitoring group (NS). Compared with the usual care group the adjusted 24 months difference in SBP was 0.6 mm Hg (NS) in the behavioural intervention alone group, -0.6 mm Hg in the home blood pressure monitoring group (NS) and -3.9 mm Hg in the combined group (p=0.01). This finding was also reflected in decreases in DBP.[114]

The overall evidence suggested that self-management interventions based on a variety of different theoretical frameworks was effective in reducing blood pressure.

7.2.9.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

One 3-arm trial using the Chronic Care Model (based on Social Learning Theory), Green (2008) compared usual care with home blood pressure monitoring plus a website interface, with or without a pharmacist support intervention. There were no differences in blood pressure control between usual care and home blood pressure monitoring plus a web-based interface group, although the home monitoring and web-based group did have a significant decrease in SBP (mean change -2.9 mm Hg, p=0.02).[117] The addition of a pharmacist intervention to home blood pressure monitoring plus a web-based intervention resulted in 25% more patients achieving

controlled blood pressure, compared with those patients receiving usual care (31%, p<0.001), and 20% more patients achieving controlled blood pressure than those in the home blood pressure monitoring plus a web-based intervention (36%, p<0.01).[117]

Green (2008) reported greater reductions in SBP in the home blood pressure monitoring plus a web-based intervention plus a pharmacist group (difference between adjusted mean change -8.9 m Hg, 95% CI -11.4 – -6.31, p<0.001) compared to usual care and similarly in the group without the pharmacist (-6.0 mm Hg, 95% CI -8.5 – -3.5, p<0.001).[117] Diastolic Blood Pressure also decreased in those patients in the home blood pressure monitoring plus a web-based intervention plus a pharmacist group (net change -3.5 mm Hg, (95% CI -4.9 – -2.1, p<0.001) compared with those in usual care.[117] For those patients with systolic blood pressure >160 mm Hg at baseline the home blood pressure monitoring plus a web-based intervention plus a pharmacist intervention had 3.3 times more patients with controlled blood pressure compared with usual care RR 3.32 (p<0.001), lower SBP -13.2 mm Hg (p<0.001) and DBP -4.6 (p<0.001).[117]

At 6 months follow-up Svetkey (2005) reported the main effect for patient intervention using Motivational Interviewing (based on multiple theories including Social Learning Theory, Transtheoretical Model, Self-regulation and Theory of Reasoned Action) was -2.6 mm Hg (95% CI -4.4 – -0.7, p=0.01). The largest effect was seen in the arms for combined physician training and patient intervention (-9.7 ± 12.7 mm Hg, p=0.0072) compared with usual care plus physician intervention usual care with no physician training and training plus no intervention. Differences did not persist at 18 months.[112] Those patients with higher baseline blood pressure had a 4.0 mm Hg greater reduction in SBP than patients who were already at goal blood pressure (p<0.0001) indicating it is most effective in specific groups.[112]

The evidence suggests a benefit in achieving blood pressure control and decreasing SBP and DBP in the health behaviour change intervention groups.

7.2.9.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

One systematic review was identified that did not report on the theoretical framework of the included trials. Chodosh (2005) reported that health behaviour change interventions decreased systolic blood pressure by a mean of 5 mm Hg (ES -0.39; 95% CI -0.51 – -0.28) and decreased diastolic blood pressure by a mean of 4.3 mm Hg (ES -0.51, 95% CI -0.73 – -0.30). P values were not given.[22]

7.3 Limitations of trial evidence for people with hypertension

The main limitation of the evidence is that those recruited and randomised to the reported trials may not be representative of all those who were eligible, and the results may not be generalisable to the rest of the population.[112, 118-120] As with other

disease-specific health behaviour change interventions the duration of follow-up is considered to be very short.[118, 119]

7.4 Overall summary of health behaviour change interventions for people with hypertension

Health behaviour change interventions based on Cognitive Behavioural Theory or Social Learning Theory are the most effective at improving some of the specified target behaviours in people with hypertension. All of the programmes or models identified in this systematic review did have a theoretical basis that included Cognitive Behavioural Theory or Social Learning Theory.

The health behaviour change interventions identified in this review that had a theoretical framework were most effective at increasing physical activity, improving medication adherence and managing blood pressure. For further details on individual outcomes refer to Appendix 27.

The evidence identified in this systematic review indicates that Cognitive Behavioural Theory or Social Learning Theory are the most effective at improving some of the target behaviours for people with hypertension.

The evidence suggests benefits in the short term for control of hypertension but there is a lack of evidence for sustained benefits (ie. more than 12 months). Caution must be taken in interpreting some results. A lack of effect of the intervention on hypertension reported in some trials[118] is probably due to the fact that the clinical outcome was within the normal range at baseline. The positive effects observed in some trials may not be sustained over time.[112, 120]

8 Health behaviour change interventions for stroke survivors

Summary for stroke survivors

Interventions based on single or multiple health behaviour change theories
No evidence identified.

Programmes or Models based on single or multiple health behaviour change theories
One Model was identified in this systematic review that was based on health behaviour change theory. The Stanford Model is based on Social Learning Theory and was found to be effective in improving some of the target behaviours in this systematic review.

Interventions with no evidence of a theoretical framework based on health behaviour change theory
Interventions with no theoretical framework in health behaviour change theory were effective at improving some of the target behaviours in this systematic review.

The health behaviour change interventions reported in this review were most effective at increasing physical activity in people who have experienced a stroke.

Summary of health behaviour change interventions for stroke survivors

	Increased physical activity	Improved depression	Improved quality of life	Increased self-efficacy
Chronic Disease Self-Management Programme (Stanford Model)	+	=	=	+
No theoretical framework	+	NR	+	NR

NR not reported; + evidence suggests a benefit for self-management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

There was no published evidence identified for improving diet and managing weight, and self-monitoring/clinical outcomes, medication adherence, health service resource use or managing blood pressure for health behaviour change interventions for stroke survivors.

A stroke is usually due to an interruption in the blood flow to the brain. The causes can be blood clots (ischaemic stroke) or bleeding in the brain (haemorrhagic stroke). There are a number of modifiable risk factors associated with stroke that include hypertension, hypercholesterolemia, smoking, high alcohol consumption, obesity and a sedentary lifestyle. The New Zealand Health Survey (2008) reported that 1.8% of adults in New Zealand had suffered a stroke of some form. There were no gender differences in the age standardised prevalence. The prevalence of stroke increased with age with 10% of those aged 75 years or older being diagnosed with a stroke at some point. Due to small numbers reported, ethnic differences were not able to be calculated. There were no differences based on levels of social deprivation for stroke.[18] Stroke is a single (or multiple) event-based disease that then requires rehabilitation and recovery.

The aim of this chapter is to establish the effectiveness of health behaviour change interventions for changing specific target behaviours in stroke survivors. The target behaviours are physical activity, dietary behaviours and weight management, depression, quality of life, self-efficacy, self-monitoring, blood pressure, medication adherence and health resource use.

The chapter also provides information on which comprehensive chronic care programmes (a commonly used type of health behaviour change intervention) are clearly based on theories of health behaviour change and how effective each programme is.

8.1 Body of evidence

8.1.1 Systematic reviews

One systematic review was identified that reported on health behaviour change interventions in stroke survivors (refer to Supplementary Material D for RapidE Chronic Care Systematic Review at www.nzgg.org.nz for further details).

- The review was considered to be of poor quality.[121]

The systematic review reported by Jones (2010) included trials of self-efficacy.[121]

8.1.2 Randomised controlled trials

Two randomised controlled trials were identified that reported on health behaviour change interventions in stroke survivors (refer to Supplementary Material E for RapidE Chronic Care Systematic Review at www.nzgg.org.nz for further details of these trials). The participants tended to be older with a mean age of 65 years or over. Further details of the population demographics can be referred to in Appendix 18. The duration of disease, education attained and ethnicity was not well described. The population was predominantly male. Two trials were conducted in Australia[122] and one in the United Kingdom.[123]

- One trial was considered to be of high quality (low risk of bias).[123]
- One trial was considered to be of mixed quality (unclear risk of bias).[122]

Refer to Appendix 19 for details of quality (risk of bias) of included trials. Appendix 20 provides further details of the duration of the interventions and who delivered them. Details of the individual components of the randomised controlled trials can be referred to in both Appendix 21 and Appendix 22.

8.2. Summary of findings

8.2.1 Increasing levels of physical activity in stroke survivors

8.2.1.1 Interventions based on single or multiple health behaviour change theories

No evidence identified

8.2.1.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

A measure of social integration, The Subjective Index of Physical and Social Outcome (SIPSO), was significantly different for the physical component in favour of the intervention group at 9 weeks (p=0.022) and 1 year (p=0.024).[123] In this trial the intervention was the Stanford Model, which is based on Social Learning Theory.

8.2.1.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Due to limited sample size statistical analysis was not conducted in the trial conducted by Marsden (2010). The intervention was a multidisciplinary group programme set in rural settings. The trial did however report a trend in favour of the intervention group in improvements in the 6 minute Walk Test.[124] The trial is likely to be underpowered to detect significant differences and the results should be interpreted with caution.

The limited evidence suggests that there may be a benefit in improved physical activity following a health behaviour change intervention compared to the control group.

8.2.2 Improving diet and managing weight in stroke survivors

There was no evidence identified that reported on dietary changes or weight management following health behaviour change interventions in stroke survivors.

8.2.3 Improving depression in stroke survivors

8.2.3.1 Interventions based on single or multiple health behaviour change theories

No evidence identified.

8.2.3.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

There were no significant differences between intervention and control groups identified using the Stanford Model, based on Social Learning Theory.[123]

8.2.3.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

There is insufficient evidence to draw any conclusions on the effects of self-management interventions on the outcome of depression in stroke survivors.

8.2.4 Improving quality of life in stroke survivors

8.2.4.1 Interventions based on single or multiple health behaviour change theories

No evidence identified.

8.2.4.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

There were no significant differences between intervention and control groups identified using the Stanford Model, based on Social Learning Theory.[123]

8.2.4.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Due to limited sample size statistical analysis was not conducted in the trial conducted by Marsden (2010). The trial was a multidisciplinary group programme set in rural settings. The trial reported a trend in favour of the intervention group in improvements in most aspects assessed for health-related quality of life.[124] The trial is likely to be underpowered to detect significant differences and the results should be interpreted with caution.

The limited evidence does not suggest a benefit in improved quality of life following a health behaviour change intervention in stroke survivors.

8.2.5 Improving self-efficacy/self-control/empowerment in stroke survivors

8.2.5.1 Interventions based on single or multiple health behaviour change theories

No evidence identified.

8.2.5.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Kendall (2007) reported significant differences in self-efficacy up to 12 months follow-up in favour of the Stanford Model (p=0.003). However these values did not improve over time and were already different at baseline.[122] The Stanford Model is based on Social Learning Theory.

8.2.5.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

Overall, there is no evidence to suggest a benefit in improved self-efficacy following a self-management intervention in stroke survivors.

8.2.6 Improved self-monitoring/clinical outcomes in stroke survivors

There was no evidence identified that reported on self-monitoring or clinical outcomes following health behaviour change interventions in stroke survivors.

8.2.7 Improved medication adherence in stroke survivors

There was no evidence identified that reported on medication adherence following health behaviour change interventions in stroke survivors.

8.2.8 Decreased health service resource use

There was no evidence identified that reported on health care utilisation following health behaviour change interventions in stroke survivors.

8.2.9 Managing blood pressure in stroke survivors

There was no evidence identified that reported on blood pressure outcomes following health behaviour change interventions in stroke survivors.

8.3 Limitations of trial evidence for stroke survivors

The evidence for the effectiveness of health behaviour change interventions for stroke survivors was limited by high attrition rates which reduce the statistical power of the results.[122, 123] In the trial reported by Kendall (2007) some of the baseline measures were already higher in the intervention group suggesting that randomisation had not been effective.[122] The trial by Marsden (2010) was limited by the relatively small sample size (n= 25) which would not have sufficient statistical power to draw conclusions about the effectiveness of the intervention.[124]

8.4 Overall summary of health behaviour change interventions for stroke survivors

There is limited evidence on the effectiveness of health behaviour change interventions for stroke survivors. One model was identified (Stanford Model) that was based on Social Learning Theory. The evidence from two trials suggested that this model was effective at improving some of the target behaviours in this systematic review. The evidence also indicated that health behaviour change interventions with no evidence of a theoretical framework based on behavioural change theory were effective at improving some of the target behaviours.

There was some evidence that physical activity may be improved compared with control groups, however there was no supporting evidence for the other target outcomes in this systematic review. It is possible that interventions aimed at stroke survivors are more likely to be physical rehabilitation interventions, which may explain the lack of published evidence for other target behaviours.

9 Non-specific (generic) health behaviour change interventions

Summary for non-specific interventions

Interventions based on single or multiple health behaviour change theories
Non-specific (generic) health behaviour change interventions that are based on Social Learning Theory are most effective at improving some of the target behaviours examined in this systematic review.

Programmes or Models based on single or multiple health behaviour change theories
One Model was identified that was based on Social Learning Theory; however, the Stanford Model was found to be equivalent to the control intervention for most of the target outcomes reported.

Interventions with no evidence of a theoretical framework based on health behaviour change theory
Interventions with no evidence of a theoretical framework based on behavioural change theory were also effective.

Health behaviour change interventions were effective in increasing physical activity, improving quality of life and improving self-efficacy.

Summary of health behaviour change interventions for non-specific (generic) interventions

	Increased physical activity	Improving diet and managing weight	Decreased depression	Improved quality of life	Increased self-efficacy	Self-monitoring/ clinical outcomes	Medication adherence	Decreased health resource use
Ecological Theory	=	=	NR	NR	NR	NR	NR	NR
Social Learning Theory and Transtheoretical Model	NR	NR	NR	NR	+	NR	NR	NR
Social Learning Theory	+	NR	+	+	+	=	NR	=
Stanford Model (Chronic Disease Self-Management Programme)	?	=	=	=	?	=	=	=
No theoretical framework	+	NR	NR	+	+	NR	NR	+

NR not reported; + evidence suggests a benefit for self-management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

No evidence was identified for the outcome of managing blood pressure in people with chronic disease.

Disease-specific health behaviour change interventions have been described in earlier chapters of this systematic review. The question addressed by this chapter is whether 'generic skills' are sufficient to be able to effectively manage a chronic condition. As populations age they are more likely to develop multiple chronic conditions. A generic self-management programme may therefore be more appropriate than a disease-specific intervention.

The aim of this chapter is to establish the effectiveness of health behaviour interventions in changing specific target behaviours in patients with chronic diseases/condtions (non-disease specific). The target behaviours are physical activity, dietary behaviours and weight management, depression, quality of life, self-efficacy, self-monitoring, blood pressure, medication adherence and health resource use.

The chapter also provides information on which comprehensive chronic care programmes (a commonly used type of health behaviour change intervention) are clearly based on theories of health behaviour change and how effective each programme is.

9.1 Body of evidence

9.1.1 Systematic reviews

Two systematic reviews were identified that reported on non-specific (generic) health behaviour change interventions. Conditions including asthma, diabetes, arthritis, hypertension, chronic pain and other non-specified chronic conditions were included in these systematic reviews (refer to Supplementary Material F for RapidE Chronic Care Systematic Review at www.nzgg.org.nz for further details).

- One review was considered to be of good quality.[125]
- One review was considered to be of mixed quality.[1]

In a Cochrane systematic review, Foster (2009) included 17 randomised controlled trials of which the theoretical basis was primarily self-efficacy in 14 of the 17 reported studies, two were based on the Theory of Reasoned Action and Social Support, and one trial did not report the theoretical framework. Interventions included structured programmes delivering self-management education, lay led or peer led.[125]

Shaw (2006) identified four generic (non–disease specific) programmes from five papers. There were no theoretical frameworks identified.[1]

9.1.2 Randomised controlled trials

Eight randomised controlled trials were identified (reported in 12 papers) that reported on non–disease specific health behaviour change interventions (refer to Supplementary Material F for RapidE Chronic Care Systematic Review at www.nzgg.org.nz for further details on these trials). The mean reported age of participants ranged from 48.5 years to 68.35 years. The duration of the chronic disease was not reported. The participants generally had low levels of educational

attainment and were predominantly female. For further details of participant demographics refer to Appendix 23. Three trials (reported in six papers) were published in the USA.[6, 7, 11-14] Two trials (3 papers) were from the UK,[126 8, 9] two trials were from the Netherlands[127, 128] and one was from Australia.[129]

- One trial was identified that was considered to be of good quality (low risk of bias).[126]
- Seven trials (eleven papers) were considered to be of mixed quality (unclear risk of bias).[127-133 11-14]
- No trials were considered to be of poor quality (high risk of bias).

The majority of the trials were considered to be of 'unclear risk of bias' overall due to lack of adequate explanation concerning randomisation and allocation concealment, lack of detail around attrition bias and lack of blinding (refer to Chapter 2, *Methodology* for further details). Refer to Appendix 24 for a summary of the quality (and risk of bias) for these randomised controlled trials. Appendix 25 provides further details on the duration of interventions and who delivered them. Details of the individual components of the randomised controlled trials can be referred to in Appendix 26.

9.2 Summary of findings

9.2.1 Increasing physical activity in people with chronic disease

9.2.1.1 Interventions based on single or multiple health behaviour change theories

Eakin (2007) used an individualised intervention based on Behavioural-ecological Theory (refer to section 3.1.7 for further details on ecological theory). The authors concluded that the health behaviour change intervention was not effective in improving physical activity outcomes.[131]

In a systematic review of trials based on self-efficacy (Social Learning Theory), Foster (2009) reported on self-reported changes in frequency of aerobic exercise from seven of 17 trials. A small but statistically significant increase was found in the intervention groups (SMD -0.20, 95% CI -0.27 – -0.12, p<0.00001).[125]

The evidence from interventions based on health behaviour change theory was mixed, with one trial reporting no difference between intervention and control groups and a systematic review reporting a significant improvement in favour of the intervention group.

9.2.1.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Four trials reported on physical activity outcomes following an intervention using the Stanford Model, which is based on Social Learning Theory. There were no differences between intervention and control groups identified by Elzen (2007) for exercise[127] or Lorig (2006) for aerobic exercise.[130] However, Lorig (2006) did report that stretching and strengthening exercise was significantly different at follow-up in

favour of the intervention (p=0.024).[130] The evidence also suggested that the intervention groups were likely to exercise more frequently than their control groups at follow-up.[9, 10]

The evidence from trials using the Stanford Model are mixed with some reporting a benefit for non–disease specific interventions and other reporting no difference between intervention and control groups.

9.2.1.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

One systematic review was identified that did not report on the theoretical framework of included trials. Physical activity scores were significantly higher in all four health behaviour change interventions compared with controls identified by Shaw (2006).[1]

9.2.2 Improving diet and managing weight in people with chronic disease

9.2.2.1 Interventions based on single or multiple health behaviour change theories

Dietary behaviour

Eakin (2007) reported that an individualised self-management intervention based on Behavioural-Ecological Theory was not effective in altering dietary behaviour and that further investigation suggested that changes in dietary habits were moderated by family and friends.[131]

9.2.2.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Dietary behaviour

Only one trial reported on dietary outcomes using the Expert Patient Programme which is a group-based variant of the Stanford Model, which is based on Social Learning Theory. No differences were identified between the intervention and control groups in dietary habits.[133]

9.2.2.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

9.2.3 Improving depression in people with chronic disease

9.2.3.1 Interventions based on single or multiple health behaviour change theories

In a systematic review of self-efficacy trials (Social Learning Theory), Foster (2009) noted that six of 17 included studies reported on depression. A small but statistically-significant effect was observed in favour of the intervention groups (ie. a reduction in depression was observed) (SMD -0.16, 95%CI -0.24 – -0.07, p=0.00036).[125]

9.2.3.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Three trials (reported in 6 papers) were identified all of which used the Stanford Model or a variant. There was no evidence of a difference between groups for depression outcomes.[126, 129, 134, 135] However, for those with higher depression scores at baseline the intervention, Homing In On Health significantly improved physical composite scores at six months (P=0.03) and one year (P=0.04). [134, 135]
Homing In On Health is an adaptation of the Stanford Model.

9.2.3.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

9.2.4 Improving quality of life in people with chronic disease

9.2.4.1 Interventions based on single or multiple health behaviour change theories

Health-related quality of life was reported in three of 17 studies identified by Foster (2009) in a systematic review of self-efficacy (Social Learning Theory) trials.[125] No differences between intervention and control groups were identified for quality of life outcomes (Weighted mean difference [WMD] -0.03, 95% CI -0.09 – 0.02; NS). Four of the included studies reported on health distress. Health distress refers to the psychological impact of the disease on the individual. A greater improvement was observed in the intervention group (SMD -0.25, 95% CI -0.34 – -0.15, p<0.00001).[125]

9.2.4.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Quality of life outcomes were reported in six trials (reported in 8 papers) of the Stanford Model or its' variants. There was no evidence of a difference between groups for the mental component of a health status measure,[127] in overall quality of life results[11, 12] or in self-reported health status.[126] Health distress had statistically significant improvement in the intervention group compared to controls at six months[129] and one year follow-up (p<0.05).[130] Kennedy (2007) reported improvements in psychological wellbeing and decreased health distress in the self-management group.[133] Those who scored lower at baseline were more likely to show

improvements after participating in the Expert Patient Programme intervention.[132] The Expert Patient Programme is an adaptation of the Stanford Model.

There were mixed results from trials using the Stanford Model with some reporting a benefit for the intervention and others reporting no differences compared with a control intervention.

9.2.4.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Shaw (2006) reported that measures of quality of life, including health distress and somatic symptoms, and self-rated health had significantly better outcomes in the intervention compared with the control groups.[1]

9.2.5 Improved self-efficacy/self-control/empowerment in people with chronic disease

9.2.5.1 Interventions based on single or multiple health behaviour change theories

Van Sluijs (2005) reported on a health behaviour change intervention based on a combination of Social Cognitive Theory (self-efficacy) and the Transtheoretical Model. A statistically significant effect was observed in improved self-efficacy subscales in favour of the intervention at the end of the intervention and at six months, but this effect was not sustained at one year follow up.[128]

Self-efficacy was significantly improved in the intervention group ($p<0.00001$) in ten out of seventeen trials identified by Foster (2009) in a systematic review of self-efficacy (Social Learning Theory).[125]

9.2.5.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Evidence based on the Stanford Model was reported in six trials (reported in 8 papers).There were no differences between intervention and usual care groups in self-efficacy reported in two trials.[127, 130] Those participating in the Expert Patient Programme intervention had significant improvements in self-efficacy[3, 9] and self-management behaviours[126] compared with wait-list controls. Similar improvements in self-efficacy were reported for participants in the intervention group compared with wait-list controls. [129] Those with low self-efficacy at baseline were more likely to improve if they participated in the Expert Patient Programme intervention as compared with the control group.[132] Although self-efficacy was significantly improved in the face-to-face Homing In On Health intervention in the short term, the effect was not sustained at one year follow-up.[11-13] Homing In On Health is an adaptation of the Stanford Model.

Overall, the evidence indicated that the Stanford Model was effective at improving self-efficacy in non–disease specific chronic disease.

9.2.5.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Self-efficacy scores were significantly higher for the intervention groups and improvements were still sustained after 1 to 2 years in the systematic review conducted by Shaw (2006). This systematic review did not report on the theoretical framework of included trials.[1]

9.2.6 Self-monitoring/clinical measures in people with chronic disease

9.2.6.1 Interventions based on single or multiple health behaviour change theories

No evidence identified.

9.2.6.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

The only evidence reporting on clinical measures was from the systematic review of self-efficacy trials (Social Learning Theory) conducted by Foster (2009). Two of 17 included studies reported on the clinical outcome of serum blood glucose levels in diabetics. There was no evidence of a difference between groups.[125]

9.2.6.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

9.2.7 Improved medication adherence in people with chronic disease

9.2.7.1 Interventions based on single or multiple health behaviour change theories

No evidence identified.

9.2.7.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

There was no evidence of a difference in medication adherence between groups in the Homing In On Health intervention compared with usual care.[134, 135] This was an adaptation of the Stanford Model, which is based on Social Learning Theory.

9.2.7.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

No evidence identified.

9.2.8 Reduced health service resource use in people with chronic disease

9.2.8.1 Interventions based on single or multiple health behaviour change theories

In a systematic review of self-efficacy trials (Social Learning Theory), Foster (2009) reported no differences between intervention and control groups for the number of visits to a physician or general practitioner in nine out of 17 studies reporting the outcome. Nor were there any differences between intervention and control groups identified in the number of nights spent in hospital in six studies reporting this outcome.[125]

9.2.8.2 Behaviour change programmes or models (including adaptations) based on single or multiple health behaviour change theories

Five trials based on the Stanford Model were identified. There were no significant differences between groups for health service utilisation (including physician visits, emergency visits or days in hospital).[3, 6, 9-11]

9.2.8.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

One systematic review was identified that did not report on the theoretical framework of the included trials. Shaw (2006) noted that three of four studies identified demonstrated a benefit for health service use compared with controls, in particular for fewer hospital stays and nights in hospital. There were no differences in visits to physicians and emergency departments.

9.2.9 Managing blood pressure in people with chronic disease

There was no evidence identified from the generic health behaviour change interventions that reported on the outcome of blood pressure.

9.3 Limitations of trial evidence from non-specific (generic) health behaviour change interventions

Clinical measures, including blood pressure and self-monitoring were not described in any of the included randomised controlled trials. Only one of the systematic reviews reported on serum blood glucose levels in diabetics. There was no evidence of clinical effectiveness.[125]

The included trials are limited in that they may not be representative of the eligible population.[3-7] Four of the trials[129, 132-137,130] recruited participants though community advertising. This type of method tends to recruit more females and more educated individuals. In some of the trials the drop outs appeared to differ from those completing the trial,[128, 130] and attrition was high in two trials.[7, 10]

The majority of the included studies only examined short-term (6 months) follow-up and therefore the long-term effectiveness of the interventions is unknown.

9.4 Overall summary of non specific (generic) health behaviour change interventions

Non-specific (generic) health behaviour change interventions, based on Social Learning Theory were effective at improving some of the target behaviours looked at in this systematic review.

The Stanford Model, which is based on Social Learning Theory, was found to be no more effective than the control intervention. Health behaviour change interventions that were not based on a health behaviour change theory were found to be effective at improving some of the target behaviours in this systematic review.

Increasing physical activity, improving quality of life and improving self-efficacy were the target behaviours that showed the greatest benefit from health behaviour change interventions. Further details of the effects on individual outcomes can be referred to in Appendix 27.

The evidence suggests that the Stanford Model or its variants appear to be successful in improving specific aspects of physical activity or the frequency of participation.[2, 6, 9, 10] The Stanford Model and its variants are also generally effective at increasing self-efficacy in the short term.[1, 126, 133-136] The longer-term benefits have not been adequately explored. Those with lower self-efficacy scores at baseline were most likely to demonstrate an improvement at follow-up.[132]

There was no evidence to support generic self-management programmes being effective in altering dietary habits or behaviour,[131, 133] or in improving depression outcomes unless baseline scores indicate higher depression levels.[3, 10-12] There was no evidence to support changes in medication adherence[134, 135] or in health service utilisation.[1, 3, 6, 9-11]

Shaw (2006) noted that generic programmes were likely to meet the needs of the more literate sections of the population;[1] however, without targeting and adapting generic programmes to lower literacy levels or culturally-appropriate interventions it means they are unlikely to engage these groups.

A generic programme for asthma patients would be unable to offer a tailored action plan for self-monitoring and medication administration and would therefore be probably ineffective.[1] Also on average generic programmes appear to be offered to older people whereas the average age for asthma patients tends to be younger. The non-specific (generic) health behaviour change programmes failed to report on clinical outcomes and the components of the interventions rarely contained any disease-specific information. In the disease-specific health behaviour change interventions knowledge about the specific disease was often an essential component. The lack of this content in the non-specific (generic) interventions may partially explain their lack of overall effectiveness.

There is insufficient evidence to support the use of generic self-management programmes. The follow-up was only of short duration and there is very limited clinical evidence in the literature.

10 Limitations of this systematic review

The evidence identified in this systematic review is subject to a number of limitations. The limitations were evident to a greater or lesser degree across all of the target conditions and should be taken into account when drawing conclusions from the data.

- Heterogeneity: The trials differ on the basis of the population, inclusion and exclusion criteria, intervention and outcomes making comparisons between health behaviour change interventions difficult.
- Lack of subgroup analysis: When different diseases or disease severity, or populations are combined (eg. Type 1 and 2 diabetes, or adults and children) there may be heterogeneity as described above. One way to explain these differences is to examine the sub-populations in a subgroup analysis. For example, there was a lack of subgroup analysis for disease severity or duration of disease in the trials included in this systematic review.
- Clinically important differences: Trials reported on statistically significant differences but did not determine if these were of clinical significance (ie. whether this had an impact on the actual clinical outcomes in the patient).
- Methodology and Bias: Method of randomisation or allocation concealment were generally poorly reported. Some of the trials were prone to selection bias (the way in which the population is recruited and if they are representative of the target population of interest), high attrition and lack of blinding.
- Cost-effectiveness and practicality: These were rarely discussed in the trials identified. This is an important omission because adoption of chronic care interventions may have significant impact on the financial resources of any primary care organisation that implements them.
- Contamination: Some trials used wait-list control groups. There was a lack of information as to contamination of these groups seeking support and information from other sources.
- Short duration health behaviour change interventions and short follow-up periods. This makes it difficult to establish the long-term benefit of the intervention.
- Lack of reinforcement of behaviour after initial intervention. Even in trials with longer-term follow-up (>6 months), there was no attempt to establish whether additional reinforcement (contact with facilitators) led to a sustained benefit.
- Usual care was poorly defined in most of the trials. It was unclear what components of education and medication review were included in usual care.
- There was no evidence for effectiveness in Indigenous peoples, although some populations with low literacy and some Hispanic populations have been targeted. These may be useful indictors.

- With the exception of those trials specifically targeting disadvantaged groups, the majority of studies would be reporting on reasonable literate or motivated individuals.
- There was very little comparison with face-to-face education.
- The impact on clinical outcomes was rarely reported, if at all in generic programmes.

11 Overall summary of health behaviour change interventions for people with a chronic disease

Overall summary

Interventions based on single or multiple health behaviour change theories
Social Learning Theory was the most widely-used, effective, health behaviour change theory. Some target behaviours were improved in four of the target chronic conditions (diabetes, asthma, hypertension and non–disease specific).

Cognitive Behavioural Theory/Therapy (as reported in COPD and hypertension), Transtheoretical Model (as reported in hypertension and non–disease specific) and Self-regulation (as reported in diabetes and asthma) were also effective health behaviour change theories.

Programmes or models (including adaptations) based on single or multiple behaviour change theories
Motivational Interviewing was most effective at improving some of the target behaviours in four of the target chronic conditions (diabetes, COPD, asthma, hypertension). Motivational Interviewing is based on multiple health behaviour change theories including Social Learning Theory, Transtheoretical Model, Self-regulation and Theory of Reasoned Action. The Stanford Model and the Chronic Care Model (both based on Social Learning Theory) showed mixed results.

Interventions with no evidence of a theoretical framework based on health behaviour change theory
Interventions which reported no theoretical framework were effective at improving some of the target behaviours in diabetes, COPD, asthma, stroke and for non–disease specific conditions.

Summary of health behaviour change interventions for people with a chronic disease

Intervention	Diabetes	COPD	Asthma	Hypertension	Stroke survivors	Non–disease specific (generic)
Interventions based on single or multiple behavioural change theories						
Social Learning Theory	+	NR	+	+	NR	+
Self-regulation	+	NR	+	NR	NR	NR
Empowerment	?	NR	NR	NR	NR	NR
Ecological	NR	NR	NR	NR	NR	=
Cognitive Behavioural Theory/Therapy	NR	+	NR	+	NR	NR
Transtheoretical Model	NR	NR	NR	+	NR	+
Programmes or Models (including adaptations) based on single or multiple behavioural change theories						
Stanford Model	?	NR	NR	NR	?	=
Chronic Care Model	+	+	NR	=	NR	NR
Flinders Program	NR	NR	NR	=	NR	NR
5As Counselling	?	NR	NR	NR	NR	NR
Motivational Interviewing	+	+	+	+	NR	NR
Interventions with no evidence of a theoretical framework based on behavioural change theory						
No theoretical framework	+	+	+	NR	+	+

NR not reported; + evidence suggests a benefit for self-management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

11.1 Interventions based on single or multiple health behaviour change theories

Interventions based on Social Learning Theory, Cognitive Behavioural Theory/Therapy, Transtheoretical Model or Self-regulation were effective at improving some of the target behaviours in the target conditions in this systematic review. Social Learning Theory was the most widely-used theory.

Interventions based on health behaviour change theories were effective at improving a number of target behaviours for the target conditions including:

- increased physical activity
- improving depression
- improving quality of life
- improved self-efficacy
- improved medication adherence.

For further details on the effects on individual outcomes, refer to Appendix 27.

11.2 Behaviour change programmes or models (including adaptations) based on single or multiple behaviour change theories

Motivational Interviewing was the most widely-used and effective programme or model based on health behaviour change theory. The Stanford Model and the Chronic Care Model showed mixed results for the target conditions.

Programmes or models (including adaptations) that were based on health behaviour change theory were effective at improving a number of target behaviours in the target conditions:

- increased physical activity
- improved medication adherence
- decreased health service resource use.

For further details on the effects on individual outcomes, refer to Appendix 27.

Note: The Flinders Model™ is used widely in New Zealand and is based on Cognitive Behavioural Theory, Problem Solving and Motivational Interviewing techniques. There is substantive literature around the implementation of this Model but little published evidence was found to support its effectiveness in the target conditions highlighted in this systematic review.

11.3 Behaviour change interventions with no evidence of a theoretical framework based on health behaviour change theory

Interventions which did not report a theoretical framework were effective at improving some of the target behaviours in five of the target conditions.

Interventions that did not report a theoretical framework were effective at improving a number of target behaviours in the target conditions:

- increased physical activity
- improved quality of life
- improved medication adherence
- decreased health service resource use
- improved blood pressure management.

11.4 What were the effective components of health behaviour change intervention?

The essential components of the self-management programmes are unclear in the individual trials reported, in that the studies do not reflect clearly what components are necessary for behaviour change and which are extraneous. However, a number of common components were found in the health behaviour change interventions that were reviewed, which means it is possible to draw conclusions on the essential components from this body of literature as a result of this systematic review.

Based on the evidence from this systematic review it is suggested that there are a number of essential components of health behaviour change interventions.

Essential components of health behaviour change interventions

- Problem solving/goal setting/written action plans
- Lifestyle (including diet and physical activity and smoking cessation)
- Disease-specific information
- Medication
- Relaxation and stress management

What this systematic review was unable to establish is the relative importance of these components in the effectiveness of the intervention. Rather than a single component it is likely that it is the integrated and holistic nature of these programmes that is effective. The programmes tend to include psychosocial, behavioural and physiological elements.

11.5 Were group or individual health behaviour change interventions better?

Whilst both group and individual-based interventions have demonstrated evidence of benefits in improved health behaviour change, there is no supporting evidence to demonstrate the overall superiority of one method over the other. From a cost-effectiveness perspective, group interventions are likely to be more appealing to providers (cost-effectiveness was not examined in this review). However, telephone interventions as a substitute to face-to-face contact may also be of value.

An ageing population is more prone to multiple illnesses requiring complex medical interventions. This inherently requires a more individualised approach to health behaviour change of each condition. The evidence suggested that a generic approach would not be effective. This is supported by Jordan (2007) who concluded that it was important to provide a number of alternative health behaviour change interventions that offer flexibility and accommodate the patient needs across the disease continuum.[138] There was also very little evidence to support the involvement of the family or carer, for whom changes in lifestyle are also likely to be affected. Only one trial (Eakin, 2007) was identified that suggested that changes in dietary habits were moderated by family and friends.[131]

11.6 Were non-specific (generic) or disease-specific health behaviour change interventions better?

Although evidence from disease-specific self-management indicated benefit for some components there was insufficient evidence for generic programmes to recommend an intervention programme. Generic studies tended not to report on clinical outcomes. This review has highlighted that disease-specific information is an essential component of health behaviour change interventions.

11.7 Which populations benefit most?

This systematic review highlighted some evidence that individuals with poorer control of their disease were more likely to gain greater benefit from a health behaviour change intervention. Prioritisation may need to be given to those with higher morbidity for whom greater efficacy may be achieved.

11.8 The value of culturally-specific and lay-led interventions

The evidence indicated that lay-led interventions and professionally-led interventions demonstrated benefit in some areas. In order to lead the interventions both professionals and lay leaders had to undergoing specific training. It is not appropriate for any health behaviour change intervention to be facilitated by an individual who has not received specific training in the intervention.

Although some of the trials attempted to be culturally specific, there was little evidence to support the benefit of peer/lay-led culturally-tailored interventions as being more effective than interventions led by health professionals. In the unique New Zealand setting it is suggested that there may be a role for trained peer leaders to facilitate aspects of health behaviour change interventions and that this probably requires further investigation.

11.9 Why some widely-used health behaviour change interventions were under-represented in this systematic review

There was a lack of evidence for the target conditions using the Flinders Programe™ which appears to be widely used in New Zealand. However, there are a number of published protocols[139, 140] that may enlighten this area when the trials are completed. Previous trial evidence to support this programme has not been associated with the target conditions of this systematic review. The Flinders Programme is based on Cognitive Behavioural Theory, Problem Solving and Motivational Interviewing techniques and based on the evidence obtained from other theoretical models and programmes; it would be likely to demonstrate some effectiveness.

Cognitive Behavioural Theory/Therapy was only reported as an intervention in two of the target conditions. However, it is widely accepted that this is also an effective intervention for the treatment of depression, which was not included as a target condition of this systematic review. Therefore, its value in improving target behaviours is probably underestimated.

11.10 Why were interventions with no evidence of a theoretical framework based on health behaviour change theory effective?

The effectiveness of interventions which did not report a theoretical framework is probably due to the fact that they did include components that were based on health behaviour change theories. Secondly, there were a number of systematic reviews that did not report the theoretical framework of the included trials. The trials may have been based on health behaviour change theories and thus the results are skewed in favour of effectiveness.
Improvements in care (medication and monitoring techniques) over the last two decades has probably reduced the effectiveness of theoretically-driven health behaviour change interventions on clinical outcomes as medication reviews and self-monitoring are likely to be an integral component of usual care. Therefore, health behaviour change becomes integral with good clinical practice.

11.11 Future avenues

This systematic review examined health behaviour change interventions that by definition were multi-component. Further research may wish to consider single component interventions, targeting single behaviours such as self-monitoring. These interventions often use telemonitoring and other mobile devices to send information (blood glucose, blood pressure) to health professionals who then contact the patient if these levels are outside acceptable clinical ranges.

It is probably important to establish the barriers to participation and to continued participation in self-management as the studies identified did indicate a reasonably high attrition rate.

12 Additional evidence and generic chronic disease self-management guidelines

The following evidence was identified outside the scope of the systematic review but was felt to be of relevance to the report.

12.1 Cochrane Overview

The Cochrane Collaboration produce Overviews, which are summaries of multiple Cochrane reviews on a similar topic. Coster (2009) reported on an Overview of 30 self-management reviews for adults, children and carers living with chronic illness. The overview included educational as well as self-management interventions that were compared with usual care or alternate forms of educational or non-educational interventions. The Overview excluded protocols and reviews of preventative care or psychological therapies alone or interventions delivered by peers/lay people as the intent was to inform nursing and other health professional practice. The Overview did include eight reviews of asthma and five reviews of diabetes amongst other chronic conditions. There were a wide variety of outcomes that included clinical, functional cognitive and health care utilisation. The Overview concluded that there was insufficient evidence to establish the effectiveness of professionally-led self-management interventions in 60% of the included reviews. This does not mean that the interventions are ineffective, but that there was insufficient evidence to make practice recommendations.

It is of interest that the aim of many of the interventions in the included reviews was to empower individuals to manage their own health. Coster (2009) noted that there were consistent differences in the focus of disease-specific reviews. For example, in asthma, COPD and diabetes the focus was on symptom monitoring and the use of ‘pre-emptive strategies’ using action plans, whereas for stroke survivors the focus was on the psychosocial problems experienced. Coster (2009) also noted the limitations of the short duration of the follow-up and the need to take caution in interpreting the results as benefits may diminish over time. There was no evidence of a benefit of group over individual interventions. Coster (2009) concludes that the best interventions to improve health seem to be those that comprise a complex package of educational and non-educational treatment.

12.2 Royal Australian College of General Practitioners chronic condition self-management guidelines

This document is presented as guidelines to inform practice of nurses and other health professionals, and another document is directed at general practice. NZGG was unable to establish the methodology behind the guideline and as such the guideline has not been appraised. There is some generalised description of the role of behavior change theory, which is mainly described in the context of the Health

Belief Model and Stages of Change. The guideline focuses on development of a patient-centred approach rather than a condition-centred approach, identification of problems, motivation and goal setting. The guideline concluded that the self-management intervention should include education and information, Motivational Interviewing, peer support and motivation, structured disease-specific programmes, lay-led self-management programmes, symptoms diaries, community-based skill groups and continuing monitoring for effectiveness.[141]

Appendices table of contents

Appendix 1. Pilot studies

Allen NA, Fain JA, Braun B, et al. Continuous glucose monitoring counseling improves physical activity behaviors of individuals with type 2 diabetes: a randomized clinical trial. Diabetes Res Clin Pract 2008;80(3):371–79.

Dale J, Caramlau I, Sturt J, et al. Telephone peer-delivered intervention for diabetes motivation and support: the telecare exploratory RCT. Patient Educ Couns 2009;75(1):91–98.

de Blok BMJ, de Greef MHG, ten Hacken NHT, et al. The effects of a lifestyle physical activity counseling program with feedback of a pedometer during pulmonary rehabilitation in patients with COPD: a pilot study. Patient Educ Couns 2006;61(1):48–55.

DeJesus RS, Chaudhry R, Leutink DJ, et al. Effects of efforts to intensify management on blood pressure control among patients with type 2 diabetes mellitus and hypertension: a pilot study. Vascular Health and Risk Management 2009;5:705–11.

Donald KJ, McBurney H, Teichtahl H, et al. A pilot study of telephone based asthma management. Aust Fam Physician 2008;37(3):170–73.

Faridi Z, Liberti L, Shuval K, et al. Evaluating the impact of mobile telephone technology on type 2 diabetic patients' self-management: the NICHE pilot study. J Eval Clin Pract 2008;14(3):465–69.

Freeman LW, Welton D. Effects of imagery, critical thinking, and asthma education on symptoms and mood state in adult asthma patients: a pilot study. J Altern Complement Med 2005;11(1):57–68.

Holt S, Ryder-Lewis S, Masoli M, et al. Fixed and adjustable dose asthma action plans based on combination therapy: a pilot study. Respirology (Carlton, Vic.) 2005;10 (4):497–503.

Huisman S, de Gucht V, Maes S, et al. Self-regulation and weight reduction in patients with type 2 diabetes: a pilot intervention study. Patient Educ Couns 2009;75(1):84–90.

Kim MT, Han H-R, Song H-J, et al. A community-based, culturally tailored behavioral intervention for Korean Americans with type 2 diabetes. Diabetes Educ 2009;35(6):986–94.

Koff PB, Jones RH, Cashman JM, et al. Proactive integrated care improves quality of life in patients with COPD. Eur Respir J 2009;33(5):1031-38.

Kritikos V, Armour CL, Bosnic-Anticevich SZ. Interactive small-group asthma education in the community pharmacy setting: a pilot study. J Asthma 2007;44(1):57–64.

Krousel-Wood MA, Berger L, Jiang X, et al. Does home-based exercise improve body mass index in patients with type 2 diabetes? Results of a feasibility trial. Diabetes Res Clin Pract 2008;79(2):230–36.

Appendix 2. Search strategy

Database: MEDLINE Pending, Ovid MEDLINE(R) <1996 to Present with Daily Update> Search Strategy:

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1. exp Self Care/(21605)
2. (self adj3 (care or manage*)).tw. (11174)
3. Patient Education as Topic/(40288)
4. patient education handout.pt. (3188)
5. self efficacy/ (8345)
6. or/1-5 (72931)
7. chronic disease/(93255)
8. (chronic* adj3 (illness* or disease* or condition*)).tw. (95063)
9. exp Asthma/(47020)
10. asthma.ti. (30149)
11. Diabetes Mellitus, Type 2/(50757)
12. (diabet* adj3 (slow onset or slow on-set or maturity onset or maturity on-set or type II or type 2 or non insulin depend* or non-insulin depend* or noninsulin depend*)).ti. (25192)
13. Stroke/ (38942)
14. (stroke* adj (cerebr* or acute)).ti. (29)
15. Pulmonary Disease, Chronic Obstructive/(14418)
16. (COPD or chronic obstructive pulmonary disease).ti. (12098)
17. exp Cardiovascular Diseases/(764972)
18. hypertension.ti. (41752)
19. or/7-18 (1001759)
20. 6 and 19 (15732)
21. "randomized controlled trial".pt. (205045)
22. (systemat* adj4 (review* or overview*)).tw. (30180)
23. meta-analysis as topic/(8918)
24. meta-analysis.pt. (24756)
25. meta analy*.tw. (31052)
26. metaanaly*.tw. (910)
27. guideline/ or practice guideline/(16003)
28. or/21-27 (285052)
29. 20 and 28 (2199)
30. limit 29 to (english language and yr="2000 -Current") (1857)
31. (letter or editorial).pt. (612049)
32. 30 not 31 (1845)

Appendix 3. Population demographics of health behaviour change randomised controlled trials for people with type 2 Diabetes

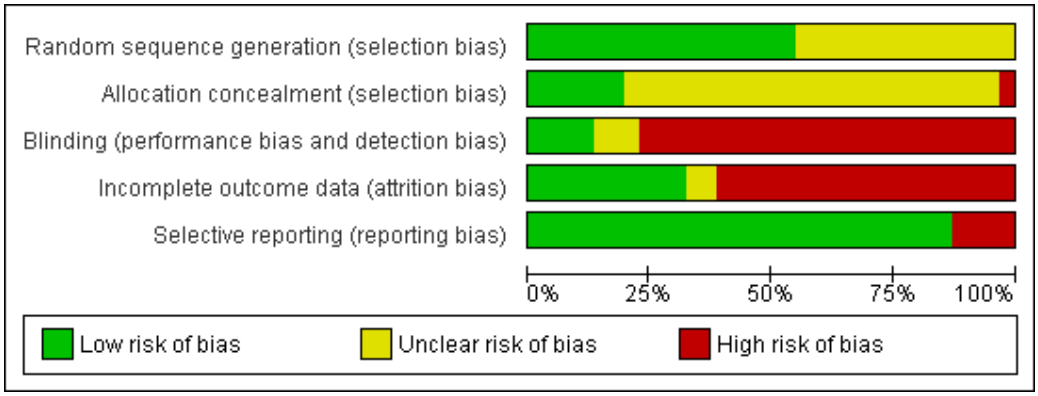
Study	Mean age (years)	Mean Duration of disease	Education	Ethnicity	Female	Baseline A1c
Deakin, 2006[51]	61.5	6.7	Mean age educated up to 15.8	nr	48%	nr
Toobert, 2011[30]	57.11	9.4 years	30% were high school graduates	100% Latino	61%	8.3%
Cade, 2009[52]	65.8	nr	20.5% degree level	95% White European	42%	nr
Sixta, 2008[63]	56.3	6.8	nr	100% Mexican American	71%	nr
Cooper, 2008[53]	59.0	6.0	nr	nr	44%	7.5%
Lorig, 2009[46]	66.7	nr	15.9 years	67.3% non-Hispanic White	66%	nr
Song, 2009[59]	50.3	4.95	63.1% attended high school	nr	57%	9.2%
Lorig, 2008[31]	52.9	nr	Mean years of education 7.5	Probably 100% Hispanic	62%	nr
Christian, 2008[32]	53.2	nr	nr	65%+ Hispanic	66.5%	8.17%
Sturt, 2008[54]	62	1-15 years	nr	80% White	39.5%	nr
Ruggiero, 2010[33]	nr	nr	nr	100% Latino or African American	nr	≥7%
Adolfsson, 2007[56]	nr	6.6	nr	nr	61%	nr
Glasgow, 2006, 2006 [34, 64]	61.5	nr	30% had achieved high school education	75% White	50.2%	7.4%
King, 2006[41]	61.5	nr	15.2% had graduate degree	76.5% White, 17.8% Hispanic	50.2%	nr
Shibayama, 2007[61]	61.5	12.0	Nr	nr	35.8%	7.35%
D'Eramo	46.0	nr	46% had high	nr	nr	nr

Study	Mean age (years)	Mean Duration of disease	Education	Ethnicity	Female	Baseline A1c
Melkus, 2010 [35]			school education or higher			
Piatt, 2006[36] Piatt, 2010[37]	66.5	11.6	nr	98.4% White	90.7%	6.9%
Kulzer, 2007[57]	55.6	6.6	nr	nr	49.7%	nr
Wattana, 2007[60]	56.8	6.18	92.5% had some primary education	nr	76.2%	8.09%
Look ahead, 2010,[38] Wadden, 2009[39]	58.7	6.8	nr	36.9% racial or ethnic minorities	59.5%	nr
Gregg, 2007[40]	50.9	6.0	24.1% had graduated from high school	28.4% Hispanic and 23.5% White	46.9%	8.19%
Anderson, 2005[42]	61.0	8.5	73% completed high school	96% African American	82%	8.6%
Anderson, 2010[43]	nr	nr	49% educated for 9–12 years	64.1% Hispanic	58%	8.0%
Bond, 2007[44]	67.2	16.95	15.85	86.5% White	45%	7.1%
Wolever, 2010[45]	53	11.2	nr	39%White, 57% Black	77%	
Thoolan, 2009[58] Thoolan, 2007[65]	61.95	17.7 months	Medium level	nr	40.5%	nr
Lorig, 2010[47]	54.3	nr	15.7 years	76% non-Hispanic White	73%	nr
Schillinger, 2009[48]	56.1	9.5	58.8 had limited health literacy	46.9% white, non-Latino	59%	9.5%
Davies, 2008[55]	59.5	nr	nr	94% White European	45%	8.1%
Samuel-Hodge, 2009; Samuel-Hodge, 2006 [49, 50]	59.2	9.0	12.4 years	African American but % nr	63.5%	nr
Watanabe, 2007[62]	50.9	nr	nr	nr	28.9%	5.55%

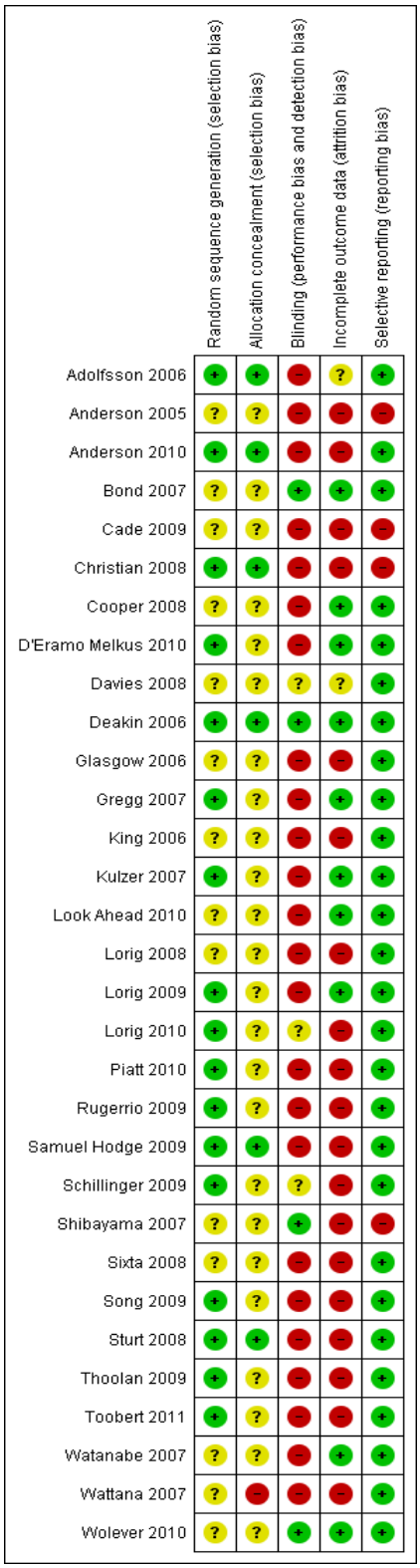
Nr=not reported

Appendix 4. Risk of bias of health behaviour change interventions (randomised controlled trials) for people with Type 2 Diabetes

Overall risk of bias for health behaviour change interventions (randomised controlled trials) for people with Type 2 Diabetes



Risk of bias in individual randomised controlled trials reporting health behaviour change interventions for people with type 2 diabetes



Appendix 5. Intervention details of health behaviour change randomised controlled trials for people with type 2 diabetes

Study	Duration of intervention	Duration of sessions	Recruitment methods	Group or individuals sessions	Comparison
Deakin, 2006[51]	6 weeks	1.5 – 2.5 hours	General practitioner, clinic/centre registers	Group	Usual care
Toobert, 2011[30]	12 months	≥4 hours	General practitioner, clinic/centre registers	Group	Usual care
Cade, 2009[52]	6 weeks	1.5 – 2.5 hours	General practitioner, clinic/centre registers	Group	Usual care
Sixta, 2008[63]	10 weeks	1.5 – 2.5 hours	General practitioner, clinic/centre registers	Group	Usual care
Cooper, 2008[53]	8 weeks	1.5 – 2.5 hours	General practitioner, clinic/centre registers	Group	Wait list control
Lorig, 2009[46]	6 weeks	1.5 – 2.5 hours	Media and community notices and advertising	Group	Usual care
Song , 2009[59]	12 weeks	2 days plus weekly contact	General practitioner, clinic/centre registers	Combined	Usual care
Lorig, 2008[31]	6 weeks	1.5 – 2.5 hours	Media and community notices and advertising	Group	Wait list control
Christian, 2008[32]	Unclear	Unclear	General practitioner, clinic/centre registers	Individual	Usual care plus educational material
Sturt, 2008[54]	12 weeks	Unclear	General practitioner, clinic/centre registers	Individual	Wait list control
Ruggiero, 2010[33]	6 months	<30 minutes	General practitioner, clinic/centre registers	Individual	Usual care plus educational material

Adolfsson, 2007[56]	1 year	1.5 – 2.5 hours	General practitioner, clinic/centre registers	Group	Usual care
Glasgow, 2006[34], 2006a[64]	8 weeks	Unclear	General practitioner, clinic/centre registers	Individual	Usual care
King, 2006[41]	8 weeks	3 hours	General practitioner, clinic/centre registers	Individual	Usual care
Shibayama, 2007[61]	12 months	<30 minutes	General practitioner, clinic/centre registers	Individual	Usual care
D'Eramo Melkus, 2010 [35]	11 weeks	1.5 – 2.5 hours	Mixed methods	Group	Diabetes education
Piatt, 2006[36] Piatt, 2010[37]	6 weeks	Unlcear	General practitioner, clinic/centre registers	Group	Usual care
Kulzer, 2007[57]	12 weeks	1.5 – 2.5 hours	Mixed methods	Group	Education alone
Wattana, 2007[60]	6 months	1.5 – 2.5 hours	No details	Combined	Education alone
Look ahead, 2010,[38] Wadden, 2009[39]	12 months	Unclear	General practitioner, clinic/centre registers	Combined	Education alone
Gregg, 2007[40]	One day workshop	4 hours	General practitioner, clinic/centre registers	Group	Education alone
Anderson, 2005[42]	6 weeks	1.5 – 2.5 hours	Media and community notices and advertising	Group	Wait list control
Anderson, 2010[43]	12 months	1.5 – 2.5 hours	General practitioner, clinic/centre registers	Individual	Usual care
Bond, 2007[44]	12 months	Unclear	Mixed methods	Combined	Usual care
Wolever, 2010[45]	6 months	1.5 – 2.5 hours	Media and community notices and advertising	Individual	Usual care
Thoolan, 2009[58] Thoolan, 2007[65]	12 weeks	1.5 – 2.5 hours	General practitioner, clinic/centre registers	Combined	Education alone
Lorig, 2010[47]	6 weeks	Unclear	Media and community	Individual	Usual care

			notices and advertising		
Schillinger, 2009[48]	Unclear	Unclear	General practitioner, clinic/centre registers	Combined	Usual care
Davies, 2008[55]	One day workshop	6 hours	General practitioner, clinic/centre registers	Group	Usual care
Samuel-Hodge, 2009; Samuel-Hodge, 2006[49, 50]	12 weeks	1.5 – 2.5 hours	Media and community notices and advertising	Group	Usual care plus additional educational material
Watanabe, 2007[62]	12 weeks	Unclear	General practitioner, clinic/centre registers	Individual	Usual care plus additional educational material

Appendix 6. Summary of components of health behaviour change interventions (randomised controlled trials for people with type 2 diabetes

Components of interventions using single or multiple health behaviour change theories in randomised controlled trials

	Diabetes facts	Diet	Smoking cessation	Relaxation/ stress management	Self monitoring/ skills	Medication	Emotions	Exercise/ physical activity	Complications/ symptom management	Problem solving	Goal setting/ exploration of values/ action planning	Manual/ additional material	Effects on family, getting on with life
Toobert, 2011 [30]		√	√	√			√	√		√	√	√	√
Davies, 2008[55]	√	√				√		√			√	√	
Kulzer, 2007[57]		√					√	√			√		
Thoolen, 2009[58]		√				√		√			√	√	
Deakin 2006[51]		√			√		√	√	√		√	√	√
Cooper 2008[53]	√	√	√	√	√			√			√		
Sturt, 2008[54]	√	√	√		√	√	√	√	√		√	√	
Rugerrio 2010[33]		√	√			√		√	√		√	√	
D'Eramo Melkus, 2010 [35]	√	√		√	√					√	√	√	√
Wattana, 2007[60]		√		√		√		√	√			√	

Anderson, 2005[42]	√						√			√	√	√	√
Bond, 2007[44]	√	√			√	√		√		√	√	√	
Adolfsson, 2007[56]	√	√			√	√		√	√		√		

Components of interventions using models or programmes based on single or multiple health behaviour change theories in randomised controlled trials

	Diabetes facts	Diet	Smoking cessation	Relaxation/stress management	Self monitoring	Medication	Emotions	Physical activity/ Exercise	Complications/ symptom management	Problem solving	Goal setting/ exploration of values/ action planning	Manual/ additional materials
Lorig, 2009[46]	√	√		√	√	√	√	√	√	√	√	√
Lorig, 2010[47]		√			√	√	√	√	√	√	√	√
Lorig, 2008[31]		√		√				√	√			
Cade, 2009[52]		√		√	√			√			√	
Christian, 2008[32]		√						√			√	√
Glasgow, 2006[34] Glasgow, 2006a[64] Williams, 2007[66]		√						√		√	√	√
King, 2006[41]*								√		√	√	
Piatt, 2006[36]Piatt, 2010[37]		√								√		
Gregg, 2007[40]	√	√			√	√		√	√		√	

Anderson, 2010[43]	√	√	√	√	√	√		√		√	√	√
Wolever, 2010[45]	√									√	√	√
Schillinger, 2009[48]		√	√		√	√	√	√	√	√	√	
Samuel-Hodge, 2006; 2009[49, 50]		√		√	√	√				√		

* Note same trial as Glasgow, 2006 but reporting on different outcome.

Components of interventions with no theoretical framework based on health behaviour change theory

	Diabetes facts	Diet	Relaxation/ Stress management	Self monitoring	Emotions	Medication	Exercise	Complications	Problem Solving	Goal setting	Additional material	Effects on family, getting on with life/coping strategies
Sixta 2008[63]	√	√		√	√		√	√	√	√	√	√
Song 2009[59]	√	√	√				√	√			√	√
Shibayama, 2007[61]		√	√			√	√	√				
Look ahead, 2010[38] Wadden, 2009[39]		√		√			√		√	√		
Watanabe, 2007[62]		√					√			√	√	

Appendix. 7. Demographics of included participants in randomised controlled trials of health behaviour change in people with COPD

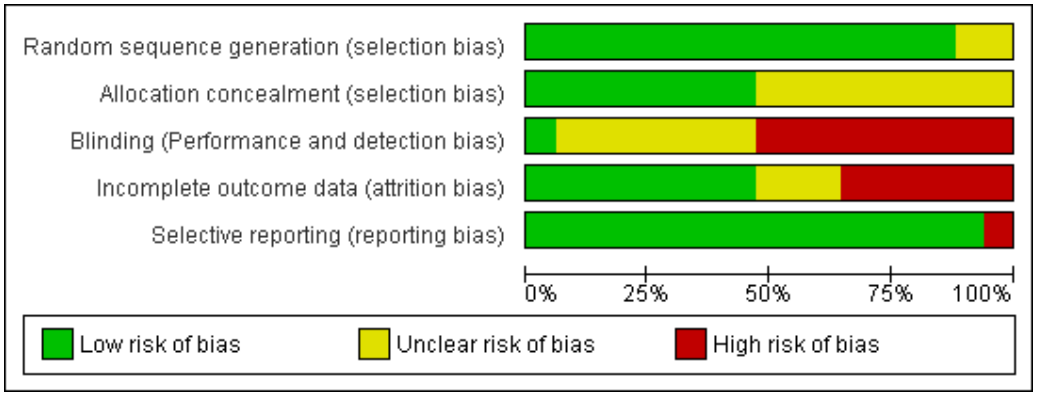
Study	Mean age (years)	Proportion female	Mean FEV1 predicted	Education	Ethnicity
ch, 2006[87]	70.9	40.5%	Median 54%	nr	NZ European
aker, 2006[88]	70	42%	45.25%	nr	nr
010[78]	66	46%	51.75%	nr	nr
, 2009[83]	62.15	40%	64.6%	nr	nr
at, 2007[89]	65.85	12%	55%	nr	nr
2008[79]	67	7.6%	38–43%	nr	nr
, 2005[80]	74	69%	55%	nr	nr
ry, 2005[90]	69	55%	0.98 – 1.0 L	9.5% ≤12th Grade	nr
2009[76]	66.5	56%	52%	had primary education only	nr
Aymerich, 2007*[86]	73	16%	1.0 – 1.2 L	ss than primary 28%	nr
2006[85]	71.9	17.5%	42%	s than primary 23.5%	nr
010[77]	69.9	2%	37.1%	nr	nr
son, 2008[91]	68	50%	d to very severe	nr	nr
008[81]	66.3	3.8%	45 – 47%	12.8 years	lack, 81% White
, 2010[84]	71	0.15%	nr	low education (primary school only)	nr
, 2005[82]	69	57%	nr	high school 39.1%	% White, 13.3% Black

*Note that this trial reports on a subgroup of Casas (2006). It is included because it reports different outcomes.

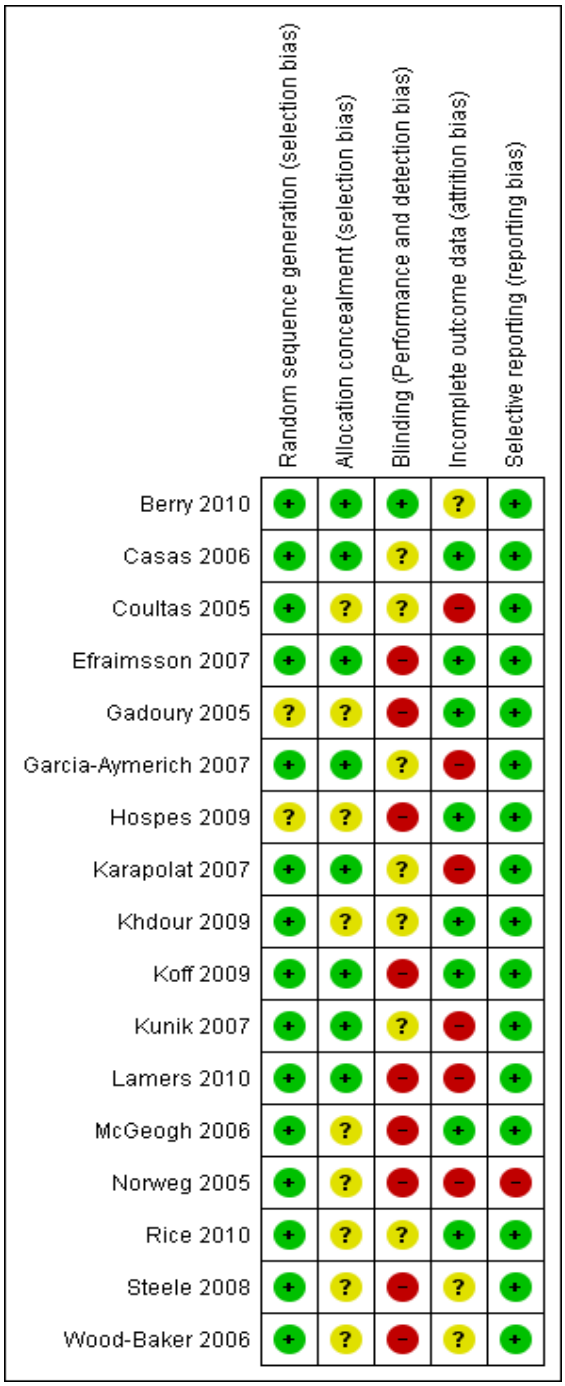
nr=not reported

Appendix 8. Risk of bias of health behaviour change interventions (randomised controlled trials) for people with COPD

Overall risk of bias for health behaviour change interventions (randomised controlled trials) in people with COPD



Risk of bias in individual trials reporting health behaviour change interventions for people with COPD



Appendix 9. Intervention details of health behaviour change randomised controlled trials for people with COPD

Study	Duration of intervention	Duration of sessions	Recruitment methods	Group or individuals sessions	Comparison
McGeoch, 2006[87]	Single session	1 hour	General practitioner, clinic/centre registers	Individual	Usual care
Wood-Baker, 2006[88]	Single session	Unclear	General practitioner, clinic/centre registers	Individual	Education alone
Efraimsson, 2008[91]	Two sessions	Unclear	General practitioner, clinic/centre registers	Individual	Usual care
Steele, 2008[79]	12 weeks	Unclear	General practitioner, clinic/centre registers	Combined	Usual care plus individual recommendations for an exercise programme
Berry, 2010[78]	12 weeks	Unclear	Combination of community advertising and physician referral	Combined	Centre based exercise therapy and bimonthly education classes
Hospes, 2009[83]	12 weeks	Unclear	Media and community notices and advertising	Individual	Usual care
Lamers, 2010[84]	12 weeks	1–2 hours	General practitioner, clinic/centre registers	Group	Usual care
Coultas, 2005[82]	Unclear	Unclear	General practitioner, clinic/centre registers	Individual	Usual care
Norweg, 2005[80]	Unclear	Unclear	General practitioner, clinic/centre registers	Combined	Education alone
Gadoury, 2005[90]	7– 8 weeks		General practitioner, clinic/centre registers	Individual	Usual care
Karapolat, 2007[89]	8 weeks	Unclear	Unclear	Unclear	Unclear
Khdour, 2009[76]	Unclear	Unclear	General practitioner, clinic/centre registers	Individual	Usual care
Kunik, 2008[81]	8 weeks	1 hour	General practitioner, clinic/centre registers	Group	Exercise training
Casas, 2006[85]	Unclear	Unclear	General practitioner, clinic/centre	Individual	Usual care

Study	Duration of intervention	Duration of sessions	Recruitment methods	Group or individuals sessions	Comparison
			registers		
Garcia-Aymerich, 2007[86]	Unclear	2 hours	General practitioner, clinic/centre registers	Individual	Usual care
Rice, 2010[77]	Single session	1 – 1.5 hours	General practitioner, clinic/centre registers	Combined	Usual care

Appendix 10. Summary of components of health behaviour change interventions (randomised controlled trials) for people with COPD

Components of interventions using single or multiple health behaviour change theories in randomised controlled trials of people with COPD

	Diet	COPD facts and education	Cognitive therapy	Self monitoring	Relaxation/ stress management	Smoking cessation	Dealing with emotions	Exercise/ physical activity	Problem solving	Complications/ symptom awareness	Goal setting/action plan	Manual/ additional material	Sleep management
Kunik, 2008[81]		√	√		√		√		√				√
Lamers, 2010[84]			√				√			√	√		

Components of interventions using models or programmes based on single or multiple health behaviour change theories in randomised controlled trials of people with COPD

	COPD facts	Diet	Relaxation	Breathing control	Complications/ Symptom awareness	Medication	Emotions	Exercise	Goal setting/action plan/strategies	Manual/ additional materials	Smoking cessation	Effects on family, getting on with life
Casas, 2006[85] Garcia-Aymerich, 2007[86]	√					√			√	√		
Hospes, 2009[83]								√	√	√		
Khdour, 2009[76]				√	√	√		√	√	√		
Coultas, 2005[82]	√	√			√	√	√		√			
Efraimsson, 2008[91]	√	√		√	√	√		√	√		√	√

Components of interventions using no evidence of theoretic framework based on health behaviour change theory

	Smoking cessation	COPD facts	Diet	Relaxation/ Stress management	Breathing control/chest therapy	Complications/ Symptom awareness	Emotions	Medication	Exercise	Problem Solving	Goal setting action plan	Social support	Sleep management	Additional material
Wood-Baker, 2006[88]	√	√	√	√	√	√		√	√		√	√		√
McGeoch, 2006[87]			√			√		√	√		√			
Berry, 2010[78]									√		√			
Karapolat, 2007[89]		√	√	√	√			√	√	√				
Steele, 2008[79]		√	√					√	√	√	√			√
Norweg, 2005[80]		√	√	√	√			√	√					
Gadoury, 2005[90]	√	√	√	√	√		√	√	√		√		√	√
Rice, 2010[77]	√	√			√	√		√	√		√			√

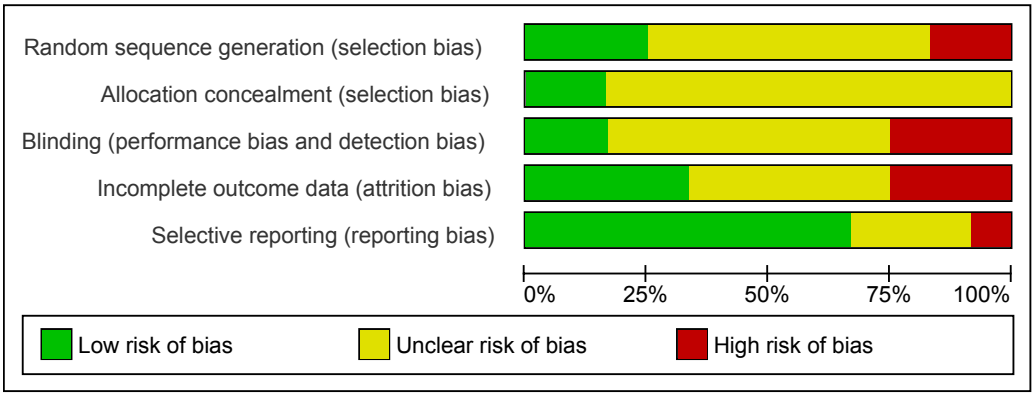
Appendix 11. Summary of demographics in randomised controlled trials of health behaviour change interventions (randomised controlled trials) for people with asthma

Author	Mean age	Duration of disease	Education	Ethnicity	Female	Severity of disease
Abdelhamid, 2008[101]	nr but 69% </= 40 years	63.5% >10 years	nr	nr	59%	nr
Clark, 2007[95]; 2010[96]	48.5 yrs	nr	30.4% with high school or less	84% White	100%	32% moderate to severe persistent
Janson, 2009[97]	38 yrs	nr	Mean 16 yrs education	64.5% White	53%	100% moderate to severe
Kuijer, 2007[102]	44 yrs	21.5 years	Mean=4.5 (on a 6-point scale, 6 highest)	nr	69%	22% moderate to severe
Magar, 2005[105]	nr, range 18–60 yrs	nr	NR	nr	nr	nr
Mancuso, 2010[98]	43 yrs	23 yrs	47% college graduate	31.5% White	84%	100% moderate to severe
Milenkovic, 2007[106]	47 yrs	10.5 yrs	nr	nr	53%	50% moderate to severe
Van der Meer, 2009[103]; 2010[104]	36.5 yrs	16.5 yrs	51% high level of education	nr	69.5%	nr
Shackelford, 2009[99]	nr	nr	nr	82% White	78%	nr
Sun, 2010[108]	40.5 yrs	59% >/=5 yrs asthma	22% university education	100% Chinese	45%	nr
Wilson, 2010[100]	45 yrs	nr	38.4% university education	62% White	57%	83.9% poorly or very poorly controlled

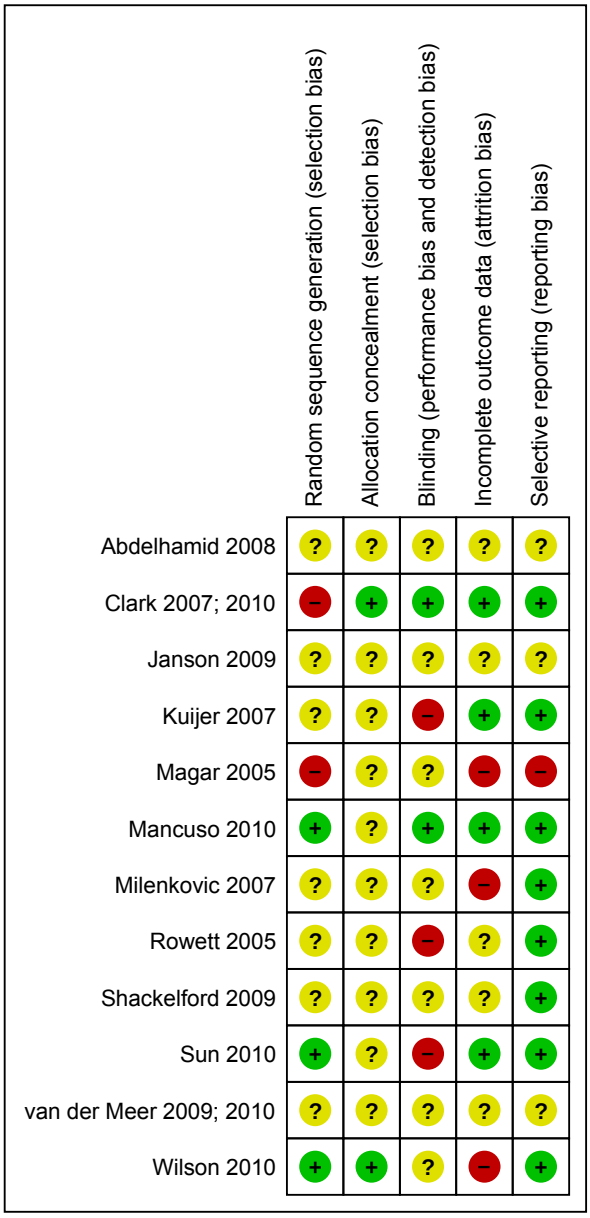
nr=not reported

Appendix 12. Risk of bias of health behaviour change interventions (randomised controlled trials) for people with asthma

Overall risk of bias for health behaviour change interventions (randomised controlled trials) for people with asthma



Risk of bias in individual trials reporting health behaviour change interventions for asthma



Appendix 13. Intervention details of health behaviour change radomised controlled trials for people with asthma

Study	Duration of intervention	Duration of sessions	Recruitment methods	Group or individuals sessions	Comparison
Abdelhamid, 2008[101]	22 weeks	Unclear	General practitioner, clinic/centre registers	Individual	Usual care
Clark, 2007[95]; Clark 2010[96]	Unclear	Unclear	General practitioner, clinic/centre registers	Individual	Usual care
Janson, 2009[97]	4 weeks	30 minutes	General practitioner, clinic/centre registers	Individual	Usual care
Kuijer, 2007[102]	4 weeks	Unclear	General practitioner, clinic/centre registers	Group	Usual care
Magar, 2005[105]	7 days over 4 to 5 months	2.5 hours	General practitioner, clinic/centre registers	Group	Wait list control with educational material
Manusco, 2010[98]	12 weeks	Unclear	General practitioner, clinic/centre registers	Individual	Educational material
Milenkovic, 2007[106]	Unclear	Unclear	General practitioner, clinic/centre registers	Individual	Usual care
Shackelford, 2009[99]	Unclear	1.5 hours	General practitioner, clinic/centre registers	Individual	Education in groups
Sun, 2010[108]	2 weeks	4 x 1 hr	General practitioner, clinic/centre registers	Group	Usual care
Van der Meer, 2009[103]; Van der Meer, 2010[104]	12 months	2 x 1 hour & weekly contact	General practitioner, clinic/centre registers	Combined	Usual care
Wilson, 2010[100]	5 sessions	Unclear	General practitioner, clinic/centre registers	Individual	Usual Care
Rowett, 2005[107]	Unclear	Unclear	General practitioner, clinic/centre registers	Individual	Usual care

Appendix 14. Summary of components of health behaviour change interventions (randomised controlled trials) for people with asthma

Components of interventions using single or multiple health behaviour change theories in randomised controlled trials in people with asthma

Author	Medication	Asthma facts	Self-monitoring/ skills	Emotions	Exercise/physical activity	Problem-solving	Goal setting	Social support	Written action plan
Clark, 2007[95]; 2010[96]		√							
Janson, 2009[97]	√	√	√						√
Kuijer, 2007[102]				√			√	√	√
Mancuso, 2010[98]		√					√		
Van der Meer, 2009[103]; 2010[104]	√	√	√						√

Components of interventions using models or programmes based on single or multiple health behaviour change theories in randomised controlled trials in people with asthma

Author	Medication	Asthma facts	Self-monitoring/ skills	Emotions	Exercise/physical activity	Problem-solving	Goal setting	Social support	Written action plan
Rowett, 2005[107]					√	√			
Wilson, 2010[100]	√						√		√

Components of interventions using no evidence of theoretic framework in people with asthma

Author	Medication	Asthma facts	Self-monitoring/ skills	Emotions	Exercise/physical activity	Problem-solving	Goal setting	Social support	Written action plan
Abdelhamid, 2008[101]	√	√	√			√			
Magar, 2005[105]	√	√	√						√
Milenkovic ,2007[106]	√						√		√
Shackelford, 2009[99]		√				√	√		
Sun, 2010[108]	√	√		√	√				√

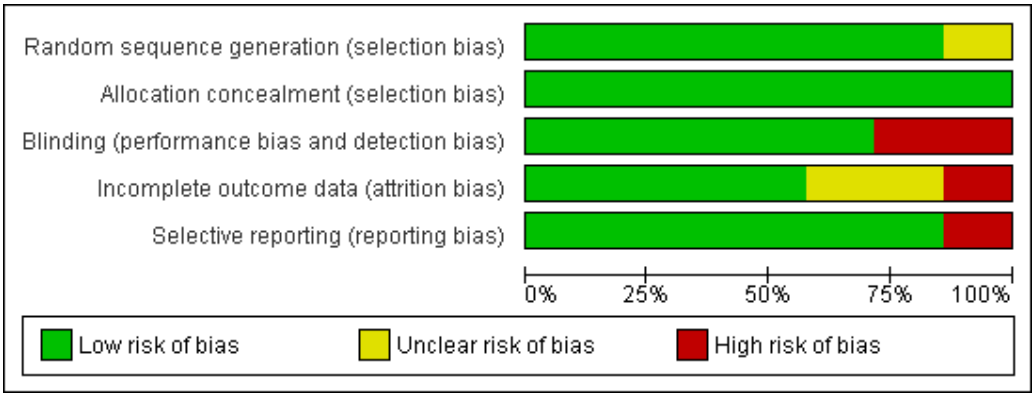
Appendix 15. Demographics of included participants in randomised controlled trials of health behaviour change interventions for people with hypertension

Study	Mean age (years)	Mean Duration of disease (years)	Education	Ethnicity	Female	Baseline blood pressure (mm Hg)
Lee, 2007[118]	71.3	nr	<4 years – 43.6%	nr	nr	152.2/82.1
Xue, 2008[119]	57.45	8.0	Junior middle school or lower as highest achievement – 37.9%	nr	58.5%	141.65/89.57
Burke, 2008[120]	nr	nr	nr	nr	33.5%	126.5/76.5
Svetkey, 2005[112]	60.5	nr	Most were high school graduates	37% Black	61%	133.1/74.1
Bosworth, 2008[113]; 2009[114]	61.5	nr	36.5% 12th grade or less education	47.5% African American	66%	nr
Bosworth, 2009[115]; 2005[116]	63.0	nr	51% high school education or less	40.1% African Americans	2%	140/76
Green, 2008[117]	59.1	nr	41.6% some post high school education	82.8% White	52.2%	151.9/89.1

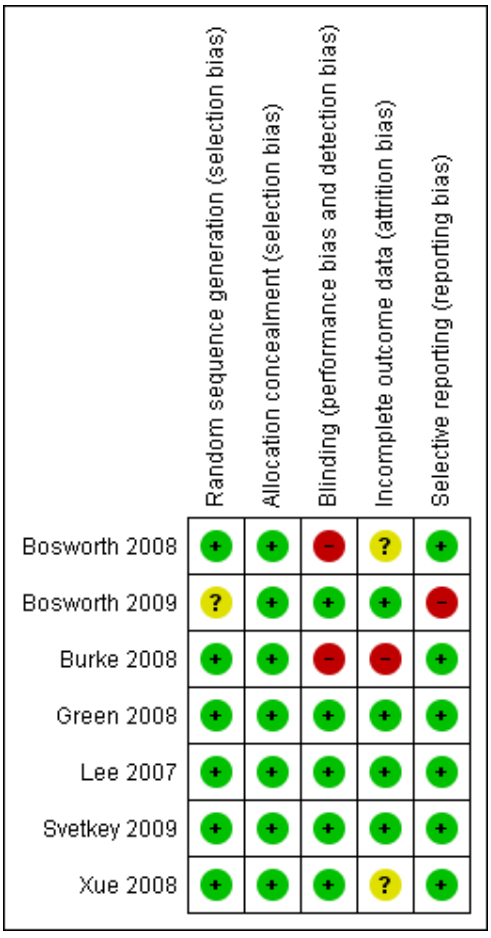
nr=not reported

Appendix 16. Risk of bias of health behaviour change interventions for people with hypertension

Overall risk of bias for hypertension health behaviour change interventions (randomised controlled trials)



Risk of bias in individual trials reporting health behaviour change interventions (randomised controlled trials) for hypertension



Appendix 17. Intervention details of health behaviour change randomised controlled trials for people with hypertension

Study	Duration of intervention	Duration of sessions	Recruitment methods	Group or individuals sessions	Comparison
Lee, 2007[118]	6 months	Unclear	General practitioner, clinic/ centre registers	Individual	Usual care
Xue, 2008[119]	5 weeks	2.5 hours	General practitioner, clinic/ centre registers	Group	Wait list controls
Burke, 2008[120]	16 weeks	1.5 hours	General practitioner, clinic/ centre registers	Individual	Usual care plus blood pressure monitoring
Svetkey, 2005[112]	1.5 years	Unclear	General practitioner, clinic/ centre registers	Combined	Usual care plus education
Bosworth, 2008[113]; 2009[114]	24 months	Unclear	Advertising	Combined	Usual care Plus education
Bosworth, 2009[115]; 2005[116]	24 months	Unclear	General practitioner, clinic/ centre registers	Individual	Usual care
Green, 2008[117]	Unclear	Unclear	General practitioner, clinic/ centre registers	Individual	Usual care plus education

Appendix 18. Summary of components of health behaviour change interventions for people with hypertension

Components of interventions using single or multiple health behaviour change theories in randomised controlled trials in people with hypertension

Author	Diet	Medication	Social support	Hypertension facts	Self monitoring	Relaxation/ stress management	Alcohol consumption	Smoking cessation	Communication	Exercise/ physical activity	Problem solving	Goal setting/action planning	Manual/ additional material
Bosworth, 2009[115]; 2005[116]	√	√	√	√			√	√	√	√			√
Bosworth, 2008[113]; 2009[114]	√	√	√			√	√	√	√	√		√	√
Lee, 2007[118]										√	√		
Xue, 2008[119]	√	√		√	√		√	√		√		√	
Burke, 2008[120]	√					√	√	√		√		√	

Components of interventions using models or programmes based on single or multiple health behaviour change theories in randomised controlled trials in people with hypertension

	Hypertension facts	Diet	Relaxation	Self monitoring	Weight management	Medication	Emotions	Exercise/	Complications	Goal setting/exploration of values	Manual/additional materials
Svetkey, 2005[112]		√			√			√		√	
Green, 2008[117]	√			√		√				√	

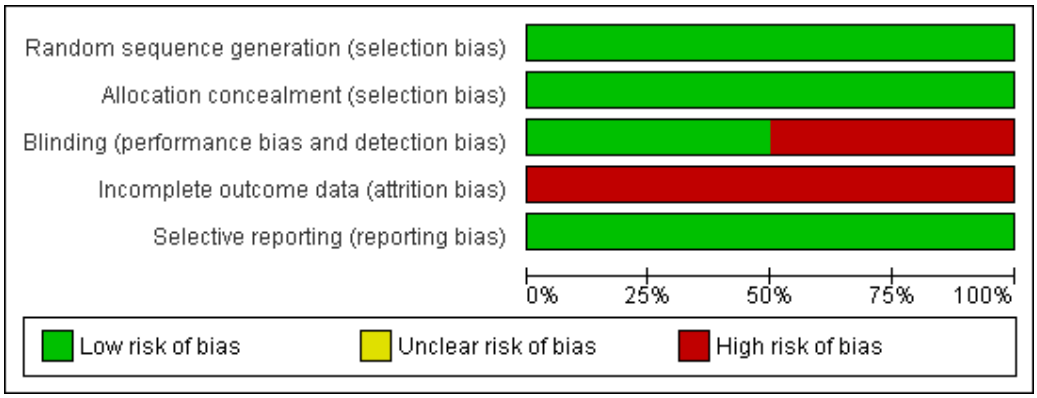
Appendix 19. Demographic details of participants in randomised controlled trials of health behaviour change interventions for stroke survivors

Study	Mean age (years)	Mean Duration of disease (years)	Education	Ethnicity	Female
Kendall, 2007[122]	65.96	nr	nr	nr	33%
Harrington, 2010[123]	70.5	nr	nr	nr	46.5%
Marsden, 2010[124]	71.6	nr	nr	nr	23.7%

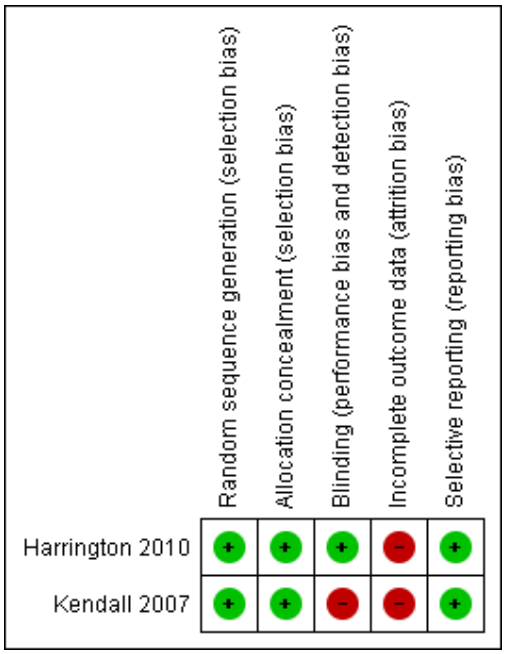
nr=not reported

Appendix 20. Risk of bias of health behaviour change interventions (randomised controlled trials) for stroke survivors

Overall risk of bias for health behaviour change interventions (randomised controlled trials) in stroke survivors



Risk of bias in individual trials reporting health behaviour change interventions for stroke survivors



Appendix 21. Details of health behaviour change interventions (randomised controlled trials) for stroke survivors

	Duration of intervention	Duration of sessions	Recruitment method	Group or individual	Comparison
Kendall , 2007[122]	6 weeks	2 hours	Consecutive cases	Group	Usual care
Harrington, 2010[123]	8 weeks	1 hour education/1 hour physical activity	Community advertising	Group	Usual care plus information sheet
Marsden, 2010[124]	Unclear	1 hour education/1 hour physical activity plus a 30 minute 'healthy options' morning tea	Consecutive cases	Group	Usual care

Appendix 22. Summary of components of health behaviour change interventions for stroke survivors

Components of interventions using models or programmes based on single or multiple health behaviour change theories in randomised controlled trials

	Stroke facts	Diet	Relaxation	Self monitoring	Medication	Communication	Emotions	Exercise	Goal setting/exploration of values	Manual/ additional materials	Problem solving
Kendall, 2007[122]	√	√	√			√	√	√	√		√
Harrington,2010[123]									√		

Components of interventions with no evidence of theoretical framework based on health behaviour change theory

	Stroke facts	Diet	Relaxation/ Stress management	Self monitoring	Communication	Emotions	Medication	Exercise	Problem Solving	Goal setting	Additional material
Marsden, 2010[124]		√	√		√			√		√	

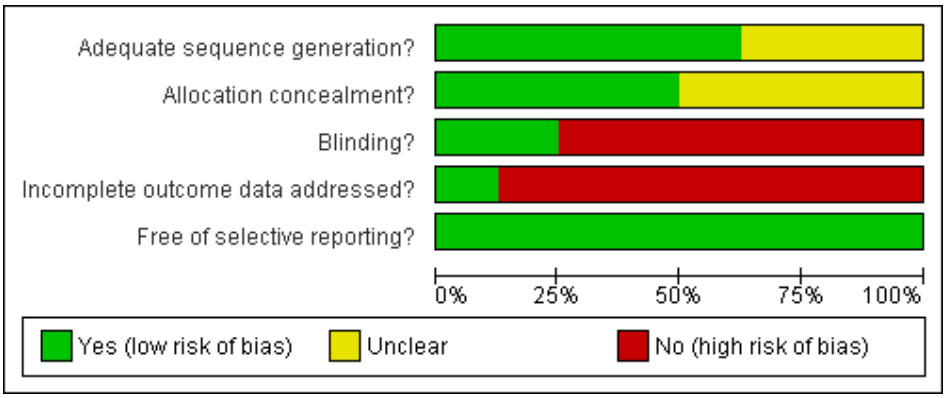
Appendix 23. Demographics of included participants in randomised controlled trials of non-disease specific (generic) health behaviour change interventions

Trial authors	Mean age (years)	Mean Duration of disease	Education	Ethnicity	Female
Jerant 2008[137], 2008[134], 2009[135], Franks, 2009[136]	60.3	nr	'well educated'	79% non-Hispanic White	77.7%
Reeves, 2008[132]; Kennedy, 2007[133]	55.4	nr	nr	94.9% White	69.8%
Swerissen, 2006[129]	65.9	nr	12.3 years old when completed education	nr	57%
Griffiths, 2005[126]	48.5	nr	Mean of 6.7 years of education	nr	76%
Elzen, 2007[127]	68.35	nr	nr	nr	63.2%
Eakin, 2007[131]	49.5	nr	15.1% were high school graduates	nr	78.5%
Van Sluijs, 2005[128]	55.5	nr	36.3% had low education level	nr	49.2%
Lorig, 2006[130]	57.5	nr	15.6 years	nr	71.4%

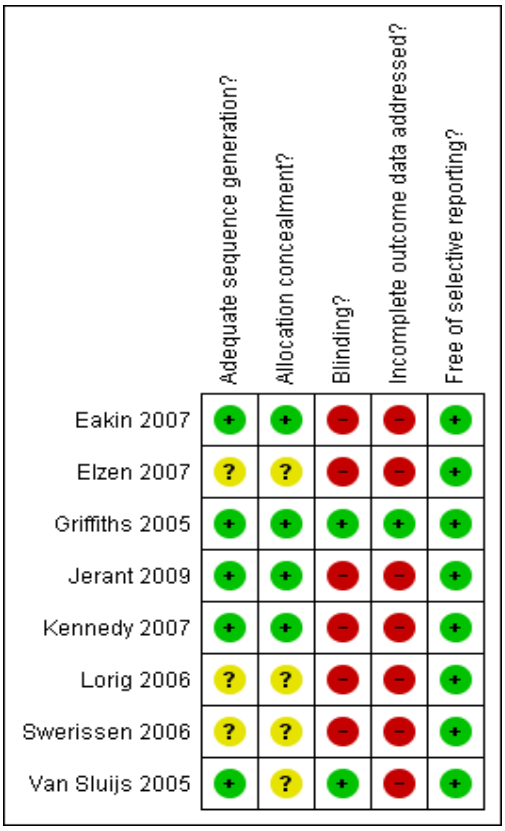
nr= not reported

Appendix 24. Risk of bias of health behaviour change interventions (randomised controlled trials) for non-specific (generic) health behaviour change interventions

Overall risk of bias for non-specific (generic) health behaviour change interventions (randomised controlled trials)



Risk of bias in individual trials reporting health behaviour change interventions for non-disease specific (generic) conditions



Appendix 25. Details of the non- specific (generic) health behaviour change interventions for chronic disease

	Duration of intervention	Duration of session	Recruitment method	Individual or group	Comparison
Jerant 2008[137], 2008[134]; 2009[135] Franks, 2009[136]	12 months	Unclear	Advertising	Individual	Usual
Reeves, 2008[132] Kennedy, 2007[133]	6 weeks	2.5 hours	Advertising	Group	Wait list control
Swerissen, 2006[129]	6 weeks	2.5 hours	Advertising	Group	Wait list control
Griffiths, 2005[126]	6 weeks	3 hours	GP/clinic registers	Individual	Wait list control
Elzen, 2007[127]	6 weeks	2.5 hours	Self referral and GP/clinic registers	Group	Usual care plus education
Eakin, 2007[131]	12 months	1 – 1.5 hours	GP/clinic registers	Individual	Usual
Van Sluijs, 2005[128]	12 months	Unclear	GP/clinic registers	Individual	Usual
Lorig, 2006[130]	6 weeks	1–2 hours for 2–3 times per week	Advertising	Combined	Usual

Appendix 26. Summary of components of health behaviour change interventions for people with a chronic disease

Components of interventions using single or multiple behavioural change theories in randomised controlled trials

Author details	Diet	Medication	Skills practice	Self monitoring	Relaxation/ stress management	Emotions	Exercise/ physical activity	Problem solving	Complications	Goal setting	Manual/ additional material	Effects on family, getting on with life
Eakin 2007[131]	√						√			√		
Van Sluijs, 2005[128]							√			√		

Components of interventions using models or programmes based on single or multiple health behaviour change theories in randomised controlled trials

	Diet	Relaxation	Medication	Emotions	Exercise	Communication	Self monitoring/ Symptom management	Problem solving	Goal setting/exploration of values/action planning	Manual/additional materials
Elzen, 2008[142]	√		√	√	√	√	√	√	√	√
Lorig, 2006[130]	√		√	√	√	√	√	√	√	√
Griffiths, 2005[126]	√	√	√	√	√	√	√	√	√	√
Swerrissen, 2006	√	√	√	√	√	√	√	√		√
Kennedy, 2007[133]; Reeves, 2008[132]	√	√	√		√	√	√		√	√
Jerant 2008[137], 2008[134], 2009[135], Franks, 2009[136]				√	√		√			

Appendix 27. Summary of evidence for individual outcomes

Increasing physical activity

	Diabetes	Chronic obstructive airways disease	Asthma	Hypertension	Stroke survivors	Non disease specific (generic)
Cognitive Behavioural Therapy/Theory	NR	+	NR	+	NR	NR
Social Learning Theory (Self-efficacy)	+	NR	NR	+	NR	+
Self-regulation	+	NR	NR	NR	NR	NR
Empowerment Theory	?	NR	NR	NR	NR	NR
Ecological theory	NR	NR	NR	NR	NR	=
Motivational Interviewing	+	+	NR	=	NR	NR
Stanford Chronic Disease Self Management Programme	=	NR	NR	NR	+	?
Flinders Programme	NR	NR	?	NR	NR	NR
Chronic Care Model	+	+	NR	=	NR	NR
No theoretical framework	+	+	+	NR	+	+

NR not reported; + evidence suggests a benefit for self management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

Decreased depression

	Diabetes	Chronic obstructive airways disease	Asthma	Hypertension	Stroke survivors	Non disease specific (generic)
Cognitive Behavioural Therapy/Theory	NR	+	NR	NR	NR	NR
Social Learning Theory (Self-efficacy)	+	NR	NR	NR	NR	+
Self-regulation	NR	NR	NR	NR	NR	NR
Empowerment Theory	+	NR	NR	NR	NR	NR
Motivational Interviewing	NR	=	NR	NR	NR	NR
Stanford Chronic Disease Self Management Programme	?	NR	NR	NR	=	=
Chronic Care Model	NR	NR	NR	NR	NR	NR
5As Counselling	NR	NR	NR	NR	NR	NR
No theoretical framework	NR	?	NR	NR	NR	NR

NR not reported; + evidence suggests a benefit for self management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

Improved quality of life

	Diabetes	Chronic obstructive airways disease	Asthma	Hypertension	Stroke survivors	Non disease specific (generic)
Cognitive Behavioural Therapy/Theory	NR	+	NR	+	NR	NR
Social Learning Theory (Self-efficacy)	+	NR	+	NR	NR	+
Self-regulation	=	NR	=	NR	NR	NR
Empowerment Theory	=	NR	NR	NR	NR	NR
Motivational Interviewing	+	+	+	NR	NR	NR
Stanford Chronic Disease Self Management Programme	=	NR	NR	NR	=	=
Flinders Programme	NR	NR	=	NR	NR	NR
Chronic Care Model	=	?	NR	=	NR	NR
5As Counselling	NR	NR	NR	NR	NR	NR
No theoretical framework	=	?	=	NR	+	+

NR not reported; + evidence suggests a benefit for self management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

Increased self-efficacy

	Diabetes	Chronic obstructive airways disease	Asthma	Hypertension	Stroke survivors	Non disease specific (generic)
Cognitive Behavioural Therapy/Theory	NR	NR	NR	NR	NR	NR
Social Learning Theory (Self-efficacy)	+	NR	+	+	NR	+
Self-regulation	+	NR	=	NR	NR	NR
Empowerment Theory	=	NR	NR	NR	NR	NR
Transtheoretical Model	NR	NR	NR	NR	NR	+
Motivational Interviewing	+	=	NR	NR	NR	NR
Stanford Chronic Disease Self Management Programme	+	NR	NR	NR	+	?
Flinders Program	NR	NR	=	NR	NR	NR
Chronic Care Model	+	NR	NR	NR	NR	NR
5As Counselling	=	NR	NR	NR	NR	NR
No theoretical framework	+	=	=	NR	NR	+

NR not reported; + evidence suggests a benefit for self management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

Improving diet and weight management

	Diabetes	Chronic obstructive airways disease	Asthma	Hypertension	Stroke survivors	Non disease specific (generic)
Cognitive Behavioural Therapy/Theory	NR	NR	NR	=	NR	NR
Social Learning Theory (Self-efficacy)	+	NR	NR	NR	NR	NR
Self-regulation	+	NR	NR	NR	NR	NR
Empowerment Theory	?	NR	NR	NR	NR	NR
Ecological Theory	NR	NR	NR	NR	NR	=
Motivational Interviewing	=	NR	NR	+	NR	NR
Stanford Chronic Disease Self Management Programme	?	NR	NR	NR	NR	=
Chronic Care Model	?	NR	NR	=	NR	NR
5As Counselling	Nr	NR	NR	NR	NR	NR
No theoretical framework	?	NR	NR	NR	NR	NR

NR not reported; + evidence suggests a benefit for self management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

Improving clinical outcomes

	Diabetes	Chronic obstructive airways disease	Asthma	Hypertension	Stroke survivors	Non disease specific (generic)
Cognitive Behavioural Therapy/Theory	NR	NR	NR	NR	NR	NR
Social Learning Theory (Self-efficacy)	?	NR	?	NR	NR	=
Self-regulation	?	NR	NR	NR	NR	NR
Empowerment Theory	?	NR	NR	NR	NR	NR
Motivational Interviewing	?	=	+	NR	NR	NR
Stanford Chronic Disease Self Management Programme	?	NR	NR	NR	NR	=
Flinders program	NR	NR	=	NR	NR	NR
Chronic Care Model	=	=	NR	NR	NR	NR
5As Counselling	+	NR	NR	NR	NR	NR
No theoretical framework	?	+	?	NR	NR	NR

NR not reported; + evidence suggests a benefit for self management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

Improving medication adherence

	Diabetes	Chronic obstructive airways disease	Asthma	Hypertension	Stroke survivors	Non disease specific (generic)
Cognitive Behavioural Therapy/Theory	NR	NR	NR	NR	NR	NR
Social Learning Theory (Self-efficacy)	NR	NR	+	NR	NR	NR
Self-regulation	=	NR	+	NR	NR	NR
Empowerment Theory	NR	NR	NR	NR	NR	NR
Transtheoretical Model	NR	NR	NR	+	NR	NR
Motivational Interviewing	+	+	+	NR	NR	NR
Stanford Chronic Disease Self Management Programme	NR	NR	NR	NR	NR	=
Chronic Care Model	NR	+	NR	+	NR	NR
5As Counselling	NR	NR	NR	NR	NR	NR
No theoretical framework	=	+	+	NR	NR	NR

NR not reported; + evidence suggests a benefit for self management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

Decreased health resource use

	Diabetes	Chronic obstructive airways disease	Asthma	Hypertension	Stroke survivors	Non disease specific (generic)
Cognitive Behavioural Therapy/Theory	NR	=	NR	NR	NR	NR
Social Learning Theory (Self efficacy)	NR	NR	NR	NR	NR	=
Self-regulation	NR	NR	+	NR	NR	NR
Empowerment Theory	=	NR	NR	NR	NR	NR
Transtheoretical Model	NR	NR	NR	=	NR	NR
Motivational Interviewing	NR	?	+	NR	NR	NR
Stanford Chronic Disease Self Management Programme	=	NR	NR	NR	NR	=
Chronic Care Model	NR	+	NR	NR	NR	NR
5As Counselling	NR	NR	NR	NR	NR	NR
No theoretical framework	?	+	?	NR	NR	+

NR not reported; + evidence suggests a benefit for self management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

Managing blood pressure

	Diabetes	Chronic obstructive airways disease	Asthma	Hypertension	Stroke survivors	Non disease specific (generic)
Cognitive Behavioural Therapy/Theory	NR	NR	NR	+	NR	NR
Social Learning Theory (Self-efficacy)	?	NR	NR	+	NR	NR
Self-regulation	NR	NR	NR	NR	NR	NR
Empowerment Theory	+	NR	NR	NR	NR	NR
Transtheoretical Model	NR	NR	NR	=	NR	NR
Motivational Interviewing	NR	NR	NR	+	NR	NR
Stanford Chronic Disease Self Management Programme	=	NR	NR	NR	NR	NR
Chronic Care Model	?	NR	NR	+	NR	NR
5As Counselling	NR	NR	NR	NR	NR	NR
No theoretical framework	+	NR	NR	+	NR	NR

NR not reported; + evidence suggests a benefit for self management intervention compared with control; ? mixed evidence, unable to make a conclusion; = evidence suggests no benefit of intervention over control

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