

Evidence Check

Principles of public health interventions

An **Evidence Check** rapid review brokered by the Sax Institute for the Motor Accidents Authority. June 2015.

This report was prepared by:

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Principles of public health interventions to support injury recovery and return to productivity: a rapid review

An **Evidence Check** rapid review brokered by the Sax Institute for the Motor Accidents Authority. June 2015.

This report was prepared by Prof Sandra Jones, Julien Tran, Dr Mairtin McDermott, Dr Michael Matthias.

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1 Executive summary

This Evidence Check reviewed the evidence in relation to other (i.e. not injury-specific) public health interventions to assess their effectiveness and identify which of the principles and strategies that underpin them could be used in public health interventions for injured people.

Method

The three reviews of the literature focused on intervention studies targeting people diagnosed with: (a) depression and mental health; (b) asthma and diabetes; and (c) back pain. These conditions were selected because within each condition, there are important attitudinal and behavioural changes that can become central to management and/or recovery.

The review addressed two primary questions:

1. What is the evidence for the effectiveness of targeted public health interventions in driving change in beliefs, attitudes, knowledge, behaviour and/or health outcomes?
2. What are the public health interventions that could be most effectively applied to support injury recovery and return to productivity?

The literature reviews were limited to interventions which targeted people with a diagnosed condition (or their healthcare providers) with the aim of investigating people's thoughts and beliefs about their condition, and endeavouring to change relevant beliefs, attitudes, knowledge, behaviour and/or health outcomes. Literature on medical or clinical interventions was not within the scope of this review. Levels of evidence from the NHMRC Evidence Hierarchy were used to evaluate the studies.

A total of 51 relevant papers were identified and included in the review. Eleven focused on people with diagnosed mental health conditions, 16 on people with diabetes or asthma, and 24 on people with back pain. This included 43 interventions that targeted people with these conditions and 10 that targeted health professionals.¹

The review also identified and summarised systematic reviews (three in the context of mental health interventions, nine in diabetes or asthma, and 10 in back pain) and study protocols (i.e. articles reporting the protocol for a study that was currently being undertaken or to be conducted in the future), consisting of eight in mental health interventions, four in diabetes or asthma, and 13 in back pain.²

Key findings

While the majority of the consumer-based studies were randomised controlled trials (NHMRC Level II evidence), many of these were of a very small scale and/or had study limitations, which limited the ability to draw firm conclusions or generalise beyond the study context. The key finding was that for many types of interventions, the evidence is unclear, tentative or inconsistent.

¹ This adds to 53 as two of the studies concurrently targeted consumers and health professionals.

² These were not in the original scope of the request, but were added as they may be of interest – particularly given the large number of studies currently underway.

What can we do with confidence (based on the current evidence)?

There was evidence that self-efficacy and/or goal setting are potentially effective approaches that could be incorporated into broader interventions, based on the increased effectiveness of individual or small group interventions that incorporated these approaches.

There was also evidence, particularly in the context of back pain, that cognitive behavioural therapy (CBT) interventions can demonstrate significant and sustained improvements.

Online and/or computerised interventions appeared to have equal or greater effects on knowledge, attitudes and behaviour than face-to-face interventions. These interventions have a lower delivery cost: flexibility in time and place of participation; the ability to target people in rural and remote areas; and the potential for anonymity. While the studies reviewed indicate a tendency for greater adherence (lower attrition rate) compared to face-to-face interventions, further research is needed to ascertain whether or not this is correct.

What can we do with caution (noting the questions raised by the current evidence)?

The most effective interventions for the three groups of medical conditions explored in this review appear to be those that are multi-component in nature. Interventions that focus on the injured individual within their social system, rather than focusing on an isolated individual, appear to result in greater and more sustained changes in knowledge, attitude and behaviour. Specifically, the small number of identified studies that included health professionals and consumers as part of a team or partnership in behaviour change, rather than the consumer or the health professional in isolation, showed strong effects. Further research is needed to explore whether or not these findings can be generalised to interventions that support injury recovery and return to pre-injury productivity.

What can't we do with confidence (given current unclear or conflicting evidence)?

The review highlighted some substantial gaps in the literature. These included the virtual absence of intervention studies undertaken with younger adults and the absence of research into interventions using social media. Both of these areas are in need of further research given the need to address all age groups, and the increasing availability and usage of social media and related technologies.

Evidence for the effectiveness of face-to-face individual or group-based interventions was particularly found to be inconsistent. Therefore, it is unclear, given their cost and resource needs, whether such interventions (in isolation) are an optimal investment of resources. However, many of the studies that are currently in the field (study protocols in this review) are larger scale face-to-face interventions, which may improve the evidence base in this area.

2 Introduction

Background

The Motor Accidents Authority (MAA) is a statutory corporation that regulates the NSW Motor Accidents Scheme. It was established by the Motor Accidents Act 1988 on 10 March 1989 and continues to be constituted under the Motor Accidents Compensation Act 1999.

A previous Evidence Check review commissioned by the MAA indicated that there is very little direct evidence, other than the potential of legislative change, for the effectiveness of public health interventions for improving injury recovery in a compensable or non-compensable setting. Consequently, the MAA wishes to explore a broader evidence base for public health intervention strategies that could improve the recovery of injured people to their best possible functional status.

The present review

The purpose of this Evidence Check is to review the evidence in relation to other (i.e. not injury-specific) public health interventions to assess their effectiveness and identify which of the principles and strategies that underpin them could be used in public health interventions for injured people.

Question 1: What is the evidence for the effectiveness of public health interventions in driving change in beliefs, attitudes, and knowledge, behaviour and/or health outcomes?

Question 2: What are the public health interventions that could be most effectively applied to support injury recovery and return to productivity?

3 Method

In order to address Question 1, we reviewed academic literature to identify public health interventions that addressed (a) depression and mental health; (b) chronic conditions, such as asthma and diabetes (the conditions identified as the focus of the review in the teleconference between the researchers, the Sax Institute and the MAA); and (c) back pain (added subsequently due to limitations of the findings from studies in the initial areas).

The primary agreed parameters for the review were as follows:

- The target population was people with diagnosed conditions (not the broad population)
- The focus was on interventions that are likely to change the way people with a diagnosed condition behave and the way they think about their condition,
- Medical or clinical interventions were out of scope.

The review also included studies targeting health professionals, where the aim was to increase their willingness or ability to bring about attitude and/or behaviour change in the target group.

Search strategy

Searches for relevant academic literature were conducted in the following research databases; Academic Search Complete, MEDLINE Complete, Psychology & Behavioral Sciences Collection, and PsycINFO.

Three separate literature searches were undertaken: one for depression and mental health; one for asthma and diabetes; and one for back pain.

Within each search, the following keywords were used:

- evaluation or efficacy or intervention or outcome or effectiveness
AND
- self-management or self-care
OR
- beliefs or attitudes or behav*
OR
- digital media or social media or webinar or e-health
OR
- physician or GP or doctor or nurse or allied health.

The search was limited to peer-reviewed journal articles written in English and published from 2004 to the date of the review.

Key inclusion criteria were:

- The target population was people with diagnosed conditions (or health professionals working with this population).
- The focus of the intervention was on changing attitudes and/or behaviour.
- The paper included data on one or more relevant measures.

- The study population was of working age (majority of participants aged 18-65 years).

Key exclusion criteria were:

- Medical or clinical interventions (surgery, physiotherapy, etc.)³
- A study population of children or retired adults
- Opinion pieces, reviews, study protocols, qualitative research or pilot research with no outcome data.

Note that, due to the relatively small number of studies identified and the rapidly changing nature of the field, we also obtained and tabulated:

- Systematic reviews
- Study protocols.

Study selection

The initial literature searches were conducted by authors MMc and JT. Abstracts of all identified articles were read to assess eligibility, and where insufficient detail was provided in the abstract (such as the age of study participants), the full paper was obtained and read to ascertain eligibility for inclusion.

All potentially relevant studies were uploaded into Covidence (Alfred Health, Melbourne), and authors SJ and MM independently coded each article (as irrelevant or as requiring full text review). Discrepancies between the two coders were resolved by discussion and review of the full paper. All articles identified as potentially relevant (i.e. requiring full text review) were then obtained, and SJ and JT independently assessed each article for inclusion.

Level of evidence

All studies were coded against the NHMRC Evidence Hierarchy; specifically the designations of 'Levels of Evidence' for intervention studies (see Table 1).

Table 1: Levels of evidence

Level	Intervention
I	A systematic review of level II studies
II	A randomised controlled trial
III-1	A pseudo-randomised controlled trial (i.e. alternate allocation or some other method)
III-2	A comparative study with concurrent controls: Non-randomised, experimental trial Cohort study Case-control study Interrupted time series with a control group
III-3	A comparative study without concurrent controls: Historical control study Two or more single arm study Interrupted time series without a parallel control group
IV	Case series with either post-test or pre-test/post-test outcomes

³ Interventions delivered by allied health professionals but not medical in nature, such as exercise programs tailored by physical therapists, were included in the review.

4 Results

The review identified 51 relevant papers – that is, papers reporting on interventions designed to bring about changes in beliefs, attitudes, knowledge, behaviour and/or health outcomes among people with diagnosed mental health conditions (11), diabetes or asthma (16), or back pain (24). This included 43 interventions that targeted people with these conditions and 10 that targeted health professionals.⁴

Question 1: What is the evidence for the effectiveness of public health interventions in driving change in beliefs, attitudes, and knowledge, behaviour and/or health outcomes?

Mental health – consumers

The review identified nine studies focusing on consumers (i.e. people diagnosed with mental health problems), ranging from mild depression to more serious psychiatric disorders (see Table A1). Of these nine studies, four were from the Netherlands, two from the UK, and one each from New Zealand, Germany and the US. None of the consumer studies were conducted in Australia.

Of the nine studies, five were Level II evidence (randomised controlled trials – RCTs) and four were Level III–3 (comparative study without concurrent controls).⁵

Four of the interventions were delivered face-to-face and thus are not reviewed here^{1–4}, but details can be found in Table A1.⁶

Online

Five online interventions were identified in the review and these generally found sustained improvements in anxiety, depression and/or burnout^{5–8} or self-efficacy.⁹ Where assessed, they found minimal changes in wellbeing⁵ or health outcomes.⁹ There was also a suggestion that high attrition in some studies may raise questions about acceptability of online interventions for mental health.^{5,8}

Mental health – health professionals

The review identified three studies with healthcare providers (including one of the consumer studies that included both target groups) – two from Australia and one from New Zealand; one Level III–2, one Level III–3 and one Level IV (see Table A2). In general, these studies showed that interventions increased knowledge and confidence among health professionals, but did not collect (sufficient) data to assess changes in patient outcomes.^{1,10,11}

Mental health – systematic reviews

The search identified two systematic reviews of interventions designed to bring about changes in knowledge, attitudes, or behaviours among people diagnosed with mental health conditions^{12,13}, and one systematic review of the evidence on the natural occurrence of self-management behaviours in the absence of intervention (see Table A3).¹⁴ While the quality of the included studies was varied, the reviews concluded

⁴ This adds to 53 as two of the studies concurrently targeted consumers and health professionals.

⁵ Note that as the focus of the review was on identifying specifics of interventions, systematic reviews are tabulated and discussed at the end of the Results section.

⁶ The request to exclude face-to-face interventions was made by MAA subsequent to the submission of the draft report, thus these papers are included in the tables.

that there was evidence for improvements in health outcomes and employment/education engagement following interventions.

Mental health – study protocols

The search identified eight study protocols (articles reporting the protocol for a study that was currently being undertaken or to be conducted in the future – see Table A4). Seven of the identified studies aim to evaluate the impact of an experimental intervention delivered face-to-face by a health professional, and one aims to evaluate the effect of an online intervention with support from psychologists as an adjunct. Aside from seeking to recruit adults aged over 18 years, none of the identified studies are targeting more specific age groups. Perhaps of greatest relevance to the current review, four of these studies^{15–18} aim to evaluate the impact of interventions on employee behaviour (e.g. labour participation, speed of return to work following sickness absence).

Chronic disease – consumers

The review identified 14 studies⁷ focusing on consumers (people diagnosed with asthma and/or diabetes). Of the 14 studies with consumers, six were from the US, three from the Netherlands, and one each from the UK, Canada, Taiwan, Turkey, and Australia (see Table A5).

Seven studies were Level II evidence (RCTs), three were Level III–2 (comparative study with concurrent controls), two were Level III–3 (comparative study without concurrent controls)⁸, and two were Level IV (single arm study with pre-test/post-test outcomes).

Eight of the interventions were delivered face-to-face^{19–26}, or via a combination of mediated and face-to-face^{27,9}, and thus are not reviewed here, but details can be found in Table A5.

Mediated

The findings of a mail-mediated intervention indicate that significant improvements in behaviours and outcomes can be achieved through a population-based program that uses educational mailings as its principal intervention, although it is likely that the concurrent targeting of patients and their physicians contributed to the success of this intervention.²⁸ A comparison of four different interventions (a physician-led video, a patient-generated community video, both videos, and a pictorial pamphlet) showed significant improvements in knowledge of asthma symptoms, inhaler use, and understanding of physician’s instructions among all groups. Of particular interest for this review is the variation in findings by participant ethnicity, age and gender.²⁹ A small-scale Australian study of telephone follow-up and text message reminders for cardiac patients with type 2 diabetes found significant improvements in self-efficacy³⁰, suggesting a need for further research into mobile phone-mediated interventions.

Online/computer-assisted

The two online interventions, both of which included personalised information and telephone support, found the interventions were effective in increasing overall activity levels³¹ and improvements in diabetes management³², although the latter study should be interpreted with caution as not all data were reported (or reported in a way that allowed for clear interpretation of results).

⁷ Fifteen studies were identified that were published in the inclusion period; one was excluded as it reported on data collected more than a decade prior and provided very limited information on effects.

⁸ Note that as the focus of the review was on identifying specifics of interventions, systematic reviews are tabulated and discussed at the end of the Results section.

⁹ For example, provided with written information following a physician-delivered education session.

Chronic disease – health professionals

The review identified three studies with healthcare providers (including one of the consumer studies that included both target groups). Two were from the US and one from Italy; one Level III–1, one Level III–2, and one Level IV (see Table A6). In general, these studies suggest that a collaborative approach – working with physicians/clinics to target patients – is likely to lead to better patient outcomes, although the lack of long-term follow up in two of the studies^{28,33} and the absence of a control group in the third³⁴ means further research is needed to confirm that this is indeed the case.

Chronic disease – systematic reviews

The search identified seven systematic reviews of computerised interventions and two systematic reviews of face-to-face self-management interventions designed to bring about changes in knowledge, attitudes, or behaviours among people diagnosed with asthma and/or diabetes (see Table A7). The systematic reviews of both face-to-face^{35,36} and computerised self-management interventions^{37–43} found supportive evidence for improvements in physical and psychosocial outcomes. Findings were inconsistent in relation to improved use of healthcare services, and a review of studies and 101 mobile applications (apps) for diabetes care found few were sensitive to the age and/or gender of users and specific user groups.³⁷ Further longitudinal mixed methodological research is needed to determine the long-term clinical, physical and psychosocial outcomes, as well as the sustainability and cost-effectiveness, of interactive computerised and face-to-face self-management interventions among chronically ill populations.

Chronic disease – study protocols

The search identified four study protocols for interventions designed to generate changes in knowledge, attitudes, behaviours or health outcomes among people living with asthma or diabetes (see Table A8). Three of these focus on patients diagnosed with diabetes and one on patients living with asthma. Three are online interventions^{30,44,45} and one a face-to-face nurse-led intervention.⁴ The studies typically target broad age groups; the follow-up periods range from 6 months to 12 months; and one study⁴⁵ focuses on cost-effectiveness of the intervention. The van Dijk-de Vries et al.⁴⁶ study may be relevant to the current review in that it aims to evaluate the impact of the implemented interventions in terms of daily functioning as well as clinical outcomes.

Back pain – consumers

The review identified 21 studies focusing on consumers (i.e. people diagnosed with back pain problems – see Table A9). Of these 21 studies, six were from the US; three were from Sweden; two each were from Australia, France and Switzerland; and one each were from the Netherlands, Denmark, Germany, Italy, Norway and the UK.

Of the 21 studies, 12 were Level II evidence (RCTs, including two cluster RCTs), three were Level II (quasi-RCTs), and six were Level III–3 (including four uncontrolled before and after studies, one non-randomised controlled trial, and one prognostic cohort study).

Ten of the interventions, including two Australian studies^{47,48}, were delivered face-to-face and thus are not reviewed here.^{49–56} Details of these interventions can be found in Table A9.

Mediated

The review identified five mediated interventions¹⁰; four from the US and one from France. Three used print media (book/booklet), one audiovisual media (DVD), and one compared different forms of media. The two small-scale print media interventions found improvements in number of days to return to work⁵⁷ and number and severity of pain episodes.⁵⁸ The one larger scale study found lower rates of reporting of persistent back pain but no differences in sick leave frequency or duration.⁵⁹ The DVD intervention found improvements in knowledge and pain beliefs/attitudes but no difference in primary outcomes⁶⁰, whereas the tailored, interactive multimedia educational intervention demonstrated statistically and clinically significant improvements in disability over 26 weeks.⁶¹

Online/computer-assisted

Six papers reported on an internet-based intervention – two each from the US and Switzerland, and one each from Sweden and Germany – five of which were RCTs and one an uncontrolled before and after study. Both of the studies conducted in the US and the one in Sweden were based on cognitive behavioural therapy (CBT). The CBT interventions generally found improvements in coping strategies, pain attitudes/beliefs and catastrophising but not for pain, impairment or physical functioning.^{62–64} Similarly, the other interventions primarily reported improvements in knowledge and attitudes – and in one case reduced pain medication use⁶⁵ – rather than activity levels or health outcomes.^{66,67}

Back pain – health professionals

The review identified four studies with healthcare providers (including one of the consumer studies that included both target groups); one each from Spain, Sweden, Germany and the Netherlands, but none from Australia or the New Zealand. All four studies were Level II evidence (RCTs, including one cluster RCT), although only one was conducted outside of an educational setting (see Table A10). Three of the studies were conducted in educational settings and primarily used vignettes as a proxy for actual practitioner behaviour.^{68–70} One larger scale study with GPs and practice nurses found some short-term improvements in physical activity that were not sustained at 12-month follow-up, suggesting that the training did not improve patient outcomes.⁷¹

Back pain – systematic reviews

The search identified 10 systematic reviews of interventions designed to bring about changes in knowledge, attitudes, or behaviours among people with back pain (see Table A11). Three reviews focused on self-management and/or adherence to home exercise programs; two of these concluded there is insufficient evidence to determine their effectiveness^{72,73}, and one⁷⁴ noted that the lack of standardised measures of adherence limit our ability to assess and compare interventions. Two reviews focused on psychological interventions for back pain^{75,76}; one on educational interventions per se⁷⁷; and two on health professionals.^{78,79} Two reviews specifically focused on return to work following back pain episodes. Heitz et al.⁸⁰ concluded that an interdisciplinary approach is justified in both the subacute and chronic disease stages, and that psychosocial interventions might be more effective in subacute stages; and Iles et al.⁸¹ found strong evidence for the predictive power (i.e. influence on return to work) of recovery expectation and moderate evidence for fear avoidance beliefs.

¹⁰ Note that studies were categorised as mediated where: (a) the only contact was in the form of print or audiovisual media; or (b) the intervention reported was the addition of a mediated intervention to usual care (including where 'usual care' was delivered face-to-face).

Back pain – study protocols

The search identified 13 study protocols for interventions among people with back pain (see Table A12). Twelve of the 13 current or future studies are being conducted in Europe and one in the US; all but one is an RCT (including four cluster RCTs). Eleven of the 13 are consumer interventions and two target health professionals.^{82,83} The majority of the consumer interventions will be delivered face-to-face: four will provide educational and/or psychosocial support and counselling^{84–87}; five will include physical activity sessions^{88–92}; and one will provide feedback via a portable battery driven stimulator box.⁹³ Only one study is an online intervention.⁹⁴

Question 2: What are the public health interventions that could be most effectively applied to support injury recovery and return to productivity?

Overall, the review identified that well-designed evidence-based interventions can clearly bring about (often substantial) changes in health-related knowledge, attitudes and behaviours. The consistency of these findings, across two very different health issues (mental health and chronic disease), suggests that these positive changes are likely to be sustained for interventions that aim to support injury recovery and return to productivity.

However, there are a number of substantial gaps in the evidence base, such as the absence of studies utilising social media, the lack of studies with younger age groups, and the small number of studies with long-term follow-up data, which means that in some areas, our conclusions and recommendations are necessarily tentative.

Generational segmentation

The majority of the mental health interventions included participants across a very broad age spectrum, such as 21–100 years⁵ and 14–73 years⁷; gave very limited age information, such as 86% were aged 31–60¹ and 'most' were aged 35–64²; or did not report on the age range of participants.^{3,4,6,8,9,95} None of the studies solely or primarily included individuals aged 18–25 years, with the closest being one study that included 36 (out of 143) intervention participants aged 21–34 years. It is likely that at least half of the intervention participants were aged 40 and over – based on the reported mean age of study participants, which ranged from 40 years^{3,7} to 52.7⁹ – but outcomes were not reported separately by age group. It is worth noting that, in the one study that did comment on age differences, attrition was higher among younger participants.⁵

Of the 10 chronic disease studies that reported these data, age ranges were again very broad, with all but three having a lower limit of 21 years or younger and an upper limit of 65 years or more. One study limited inclusion to those aged 25 and over³¹, one to those aged 30–70²², and one to those aged 40–70.²⁰ Of the 14 studies that reported the mean age of participants, this ranged from 41 years²³ to 63 years²⁹, with 12 having a mean age of 50 years or above. Consistent with the mental health studies, the one study that included some commentary on age differences noted that attrition was higher among younger participants; and the authors suggested that future studies should include methods to facilitate younger people's participation and retention.²⁵

Of the back pain studies, only six explicitly stated the age range of participants and these were very broad, with five having a lower limit of 21 or younger and an upper limit of 65 or over. The mean age of study participants was 50 years or over in five studies and 40–49 years in 12 studies. Unlike the other two conditions, there were a small number of studies with slightly younger participants – including one with a mean age of 36⁵⁷, one with military personnel with a mean age of approximately 30 years⁶¹, and one with an age range of 19–45, mean age not stated.⁵⁶ However, this was a small minority of the studies. Within studies, where this detail was provided, attrition was higher in younger participants than older participants.⁴⁸

This suggests that many of the findings may be limited to older participants. Further research needs to be conducted with younger cohorts to assess the acceptability and effectiveness of different intervention designs for this target group.

Other demographic segmentation issues

While not a question posed in the review scope, we note the importance of considering gender as a factor in the uptake and outcomes of interventions. The reviewed literature suggests that females are more likely to participate in mental health interventions than males; eight of the studies reported the gender distribution of participants and, with the exception of the small pilot study², there was a strong gender skew – ranging from 61% female⁴ to 79.6% female.⁵ This gender imbalance was also evident, although not as extreme, in the back pain studies – with nine of the 20 studies for which mean age was reported having more than 60% female participants, including five studies with 70% or more. This was not the case, however, for the asthma and diabetes interventions, where the majority of studies had a fairly even gender distribution, and those few with a high proportion of female participants were balanced out by others with a high proportion of male participants.

We also note that most of the included studies focused on majority populations, or did not report on the ethnic breakdown of participants. One Canadian study with ethnic Chinese and Punjabi adult asthma patients²⁹ noted substantial differences in knowledge and behavioural outcomes between the two groups, emphasising the importance of tailoring interventions to the targeted cultural group. Thus, if there are substantial cohorts of specific cultural groups within the ‘injury recovery’ population, interventions will need to be developed that are culturally relevant and linguistically appropriate.

Social and traditional ‘mass’ media

None of the identified studies reported on interventions conducted via, or utilising, social media - despite the inclusion of ‘social media’ as a search term. One study³⁰ used SMS (text messaging) as a strategy in a multi-component intervention. The only other reference to social media we identified was where some studies reported using Facebook or other social media as a recruitment strategy (alongside posters, news items, mail-outs, etc.).

The nature of social media in some ways inherently conflicts with the nature of research ‘evidence’, in that social media based interventions do not allow for the degree of control over exposure to materials that is typically expected for a scientific study and publication in a scientific journal. However, there is a small but growing body of evidence that social media can be used to bring about changes in condition or risk factor specific knowledge, attitudes and behaviours.⁹⁶

While none of the studies identified in this review delivered an intervention primarily (or even partly) via social media, this approach has substantial advantages over traditional media in its ability to communicate with discreet target audiences and to tailor messages to the information-related needs and communication preferences of individuals and/or small groups.⁹⁷ It also has advantages over face-to-face (individual or group) interventions in that it enables target individuals to participate in the intervention at a time and location that is suitable to them, with a degree of anonymity, and can often be delivered at a substantially lower cost than face-to-face or traditional media interventions.⁹⁸

There is some evidence in the cancer-related literature that social media interventions can be used successfully to support patients during treatment and recovery⁹⁹, and it is likely that such approaches could be used successfully in the delivery of programs to support injury recovery and return to productivity. It is also likely that such interventions would be more appealing to younger target groups, many of whom are comfortable receiving and sharing health-related information online.¹⁰⁰

None of the included studies used traditional 'mass media' (e.g. television, magazines and radio advertising), as the brief specifically detailed that we focus the review on those diagnosed with the relevant medical condition and exclude studies that took a broader population-based approach to changing knowledge and attitudes among those without a current diagnosis. Mass media interventions are expensive and do not allow for the dissemination of detailed information, and thus are generally inappropriate for targeting those diagnosed with specific conditions. However, they have been successfully used to bring about awareness of the prevalence of medical conditions¹⁰¹, to bring about health-related behaviour change at a population level¹⁰², and to address stigma associated with some conditions.¹⁰³

Mediated (not 'mass' media) interventions

Five of the back pain studies used non-mass media (pamphlets, booklets or DVDs). In the main, these studies showed improvements in knowledge and attitudes but not in clinical outcomes. However, there was some preliminary evidence from small scale studies that mediated educational interventions focusing on factors such as spine position and the role of exercise could lead to improvements in pain levels and reductions in time off work. However, there is a need for further exploration of these interventions using larger samples and controlled study designs. Further, the one multimedia study that was reported did identify statistically and clinically significant improvements in outcomes⁶¹, suggesting that further research into the use of different media formats in combination may be useful.

Digital technology

Across all of the conditions, there was evidence that digital (online) interventions appear to be effective in improving knowledge and may be useful in addressing attitudes and beliefs regarding symptoms and condition management. However, in the main, these interventions did not bring about significant or sustained changes in behaviour or in clinical outcomes. This was particularly evident in the back pain studies, where a greater number of online interventions were identified in the literature.

There is some indication that online/digital interventions may have greater acceptability than face-to-face interventions, based on attrition data. Of the papers that reported these data from online studies in the mental health context, attrition rates were 21%⁷, 29%^{9,11}, 35%⁶, 38%⁵ and 45%.⁸ This compares favourably to the data reported for face-to-face interventions, with attrition rates of 43%⁴ and 46%.³ Only three studies reported on attrition at longer-term follow-up; two online intervention at 35% (Ebert et al., 2013) and 65% (Ruwaard et al., 2012) and one face-to-face intervention at 40% (Lambert et al., 2010).

This suggests that online/digital interventions may have greater adherence (lower attrition) than face-to-face interventions. However, the small number of studies and the contrasting findings mean that further research is needed to ascertain whether this is correct.

Theory-based interventions

The findings in the back pain literature for face-to-face 'educational' interventions reflected that of other conditions – that, in general, these were effective in changing knowledge and attitudes/beliefs but were of limited effectiveness in changing behaviour (and no more so than online interventions, which have broader reach and lower cost). However, a different picture emerged when these interventions were based on CBT. Of the four CBT-based programs, three demonstrated significant and sustained improvements in self-reported health and wellbeing (such as disability, pain, quality of life), relevant behaviours (such as fear avoidance behaviours), and clinical and occupational outcomes (such as self-reported 'recovery' and sick leave frequency and duration). This is consistent with the findings for the online CBT-based interventions for

¹¹ Reported as 71% adherence.

both back pain and mental health conditions, which demonstrated improvements in attitudes and beliefs, and suggests that this may be a more effective approach than educational interventions that are based on other approaches.

Influencing health service providers

As described above, the review identified three interventions in the mental health context that directly targeted health professionals. Two of these focused on training GPs to diagnose and manage mental health conditions; one used a 1–2 day workshop¹ and the other a 42-week online course.¹⁰ Both found improvements in GP knowledge, confidence and competency. However, not all of these improvements were sustained over time, suggesting that, as with consumers, there is a need for ongoing support and reinforcement of learnings. The third study reported on the outcomes of a more system-based approach to improving GP knowledge and capacity – the Better Outcomes in Mental Health Care Initiative. In addition to providing training to GPs and supporting linkages to allied mental health practitioners and psychiatrists, this initiative also provides incentive payments for mental health work. Participating GPs expressed more positive attitudes towards mental health work and were less likely to express a need for further assessment and diagnosis training. This recognises the realities of the Australian healthcare system with increasing pressure on GPs to manage expanding case loads.¹⁰⁴

The two studies in the chronic disease domain that focused on health professionals led to similar conclusions. The large case-control study conducted in the US provided targeted educational materials to patients and their physicians to encourage more effective self-management of asthma, with statistically and clinically significant effects. The Italian study³⁴, which utilised care managers in GP offices to create care ‘teams’ facilitated by an evidence-based, internet decision support tool, demonstrated significant improvements in health-related behaviours and reductions in risk factors. Finally, the Sieber et al.³³ study, while targeting individual patients rather than healthcare providers, was conducted via family medical clinics and encouraged participants to see their doctor and undertake recommended screening tests.

The back pain literature included four studies that targeted health professionals, although only one of these was delivered outside of a tertiary education setting.

In combination, this body of literature suggests that interventions that engage both consumers and healthcare professionals, build collaborative teams or provide GPs with support in referring to specialists, and which provide financial incentives to support disease management, are likely to be effective in improving health provider engagement and patient outcomes.

Engagement with opinion leaders

None of the studies included in the review focused on engagement with opinion leaders, other than those that worked with/via health professionals or healthcare services. That is not to say that none of the interventions included any engagement with opinion leaders – perhaps in the development of the intervention – but that this was not specifically reported in the published papers.

Cost (and cost-effectiveness)

None of the identified studies reported on the costs of delivering the interventions, the financial benefits of the improvements in outcomes, or the overall cost-effectiveness of the interventions. It is interesting to note that the majority of study protocols included reference to providing cost-effectiveness information – suggesting that this information may have been collected, but not reported, in the reviewed studies.

Applicability to the local context of the studies

Of the nine interventions with consumers in the mental health domain, none were from Australia and one was from New Zealand. The majority were from the Netherlands (four) and the UK (two), with one each from Germany and the US. Similarly, of the chronic disease interventions with consumers, only one was conducted in Australia. Of the consumer-focused back pain studies, the majority (seven) were conducted in the US, with three in the Netherlands and one each in the UK, Canada, Taiwan and Turkey. Of the back pain interventions, the majority were from Europe (13) or the US (six), with two from Australia.

In terms of consumer knowledge and beliefs, and underlying social norms and perspectives (including stigma in the case of mental health and barriers to help-seeking for all three types of behaviours), it is likely that the findings are largely generalisable to Australia, given cultural similarities between Australia, the US and Canada, the UK and many European countries. However, the healthcare systems vary widely across countries, suggesting that there would need to be consideration of how the various interventions could be integrated into, and funded within, the Australian healthcare system.

Of the three studies conducted with health professionals in the mental health domain, two were in Australia and one in New Zealand, and thus the findings are largely applicable to the local context. This is not, however, the case for the chronic disease interventions with the two identified studies involving health professionals being from the US and Italy; or the back pain interventions with health professionals, which were all conducted in Europe.

5 Recommendations

Given the current state of the literature, as identified in this review, the majority of our recommendations are tentative or involve recommendations for further research.

What interventions could we undertake with confidence based on current evidence?

Theoretical approaches/components

R1: Self-efficacy and goal setting are potentially effective strategies that could be incorporated into interventions designed to bring about changes in attitudes and behaviours, and can be integrated into a range of intervention designs and delivery modes to support injury recovery and return to productivity.

R2: There appears to be strong support for the effectiveness of CBT-based interventions in reducing pain and in increasing targeted pain management and rehabilitation behaviours. While CBT-based interventions can be time-consuming and expensive in comparison to basic 'educational' interventions, their superior outcomes suggested that serious consideration should be given to their integration into programs to support injury recovery and return to productivity.

Systemic interventions

R3: Interventions which target the individual within the broader context of their healthcare appear to be more effective than interventions which target the individual in isolation. Given the nature of the target population, and their ongoing engagement with health professionals, it is likely that this would be the case for interventions to support injury recovery and return to productivity.

R4: Interventions that provide practical and financial support to GPs (or other healthcare providers) appear to be more effective in engaging providers and improving patient outcomes. Consideration should be given to providing specific resources to healthcare professionals to encourage them to engage with patients to support injury recovery and return to productivity.

What interventions could we undertake with some additional research to address questions raised by the current evidence?

Online interventions (alone and as part of a broader approach)

R5: Online interventions appear to have the potential to be at least as effective as face-to-face interventions in relation to changing knowledge, attitudes and beliefs – with added benefits of cost, reach and flexibility. Consideration should be given to the development and delivery of online interventions with target populations to support injury recovery and return to productivity.

R6: Multi-component (multi-modality) interventions appear to be more effective than single component (single modality) interventions, but further research is needed to confirm that this would be the case for interventions to support injury recovery and return to productivity.

What are the gaps in the evidence that should be addressed by future research?

Young adult populations

R7: There is a need for research to explore (a) the barriers and facilitators to intervention participation among younger adults; (b) preferences for delivery modes among younger adults; and (c) effectiveness of interventions tailored to younger adults supporting injury recovery and return to productivity.

Online interventions

R8: There is a need for further research to confirm the tentative finding from this review that online interventions have greater adherence (lower attrition) than face-to-face interventions.

R9: The evidence from the back pain literature suggests that improvements in knowledge, attitudes and beliefs achieved by online interventions may not extend to behaviour change or clinical outcomes (despite some preliminary evidence of this in the context of the other conditions). There is a need for further research into the efficacy of online interventions for behaviour change and clinical outcomes in the injury recovery and return to productivity context, including consideration of the combination of low-cost online components (for knowledge, attitudes and beliefs) with higher-cost face-to-face components for behaviour change.

Social media and technology

R10: There is a need for research to explore the feasibility and efficacy of social media as a delivery platform for interventions to support injury recovery and return to productivity.

R11: There is a need for research to explore the feasibility and efficacy of personal digital devices as an adjunct to face-to-face or online interventions to support injury recovery and return to productivity; in particular, the acceptability and efficacy of these tools with younger cohorts.

Face-to-face interventions

R12: Evidence for the effectiveness of face-to-face individual or group-based interventions is inconsistent, and it is unclear whether such interventions (in isolation) are an optimal investment of resources to support injury recovery and return to productivity.

6 Conclusion

This Evidence Check identified a total of 51 relevant intervention study papers; 11 focused on people with diagnosed mental health conditions, 16 focused on people with diabetes or asthma, and 24 focused on people with back pain. Of the 43 interventions that targeted people with these conditions, 24 were randomised controlled trials (NHMRC Level II evidence). Therefore, perhaps the most surprising finding was that the evidence yielded from the various types of interventions is unclear, tentative and/or inconsistent. Encouragingly, we identified 25 study protocols (i.e. published articles reporting the protocol for a study that was currently being undertaken or to be conducted in the future), which suggests that the evidence for behaviour change interventions among people diagnosed with an ongoing medical condition will become clearer as these studies are completed and published.

Based on the reviewed literature, it appears that online and/or computerised interventions may have equal or greater effects on knowledge, attitudes and behaviour than face-to-face interventions. However, the most effective interventions appear to be those that are multi-component in nature when compared to similar but single component interventions. Interventions that focus on the injured individual within their social system, rather than focusing on an isolated individual, appear to result in greater and more sustained changes in knowledge, attitude and behaviour. Similarly, interventions that include health professionals and assist them to participate in collaborative teams appear to be more effective in improving health provider engagement and patient outcomes.

The review highlighted that more research is needed to address some of the specific questions of interest to the MAA. The review could not provide guidance on generational segmentation as the published studies did not focus on younger adults; the use of social media was not incorporated in any of the studies reviewed; none of the studies focused on engagement with opinion leaders, other than those that worked with/via health professionals or healthcare services; and none reported on the costs of delivering the interventions, the financial benefits of the improvements in outcomes, or the overall cost-effectiveness of the interventions. Of the 43 interventions with consumers, only three were conducted in Australia, and of the 10 interventions with health professionals, only two were conducted in Australia, which makes it difficult to ascertain the applicability of the findings to the local context.

In conclusion, this review identified some key considerations and provided 12 specific recommendations for the development of interventions to support injury recovery and return to productivity. However, it also identified numerous gaps and inconsistencies in the existing evidence base, which demonstrates that there is a need for more research to inform definitive guidelines for the development and delivery of such interventions.

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8 Appendices (tabulated data)

Table A1: Mental health interventions – consumers

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/ implications
Bolier et al. ⁵	The Netherlands	RCT Level II (Intervention group compared to a waiting list control)	284 participants with mild to moderate depressive symptoms (143 intervention, 141 control) Mean age = 43.2 (SD = 11.8) 79.6% female Recruited online from the 'adult, wellbeing seeking population' in the Netherlands via banners and ads placed in free newspapers and on Facebook.	<i>Intervention:</i> Participants received an online, self-help intervention to improve 'mental fitness'. The intervention combines evidence-based exercises based on positive psychology with elements taken from mindfulness, CBT and problem-solving therapy. It contains six modules: 1. Personal mission statement and setting your goals 2. Positive emotion 3. Positive relations 4. Mindfulness 5. Optimistic thinking 6. Mastering your life	At 2 months, the experimental group reported significant: <ul style="list-style-type: none"> Improvement in wellbeing (the primary outcome) on the scores of one measure, but not a second Decline in depressive symptoms and anxiety Improvement in self-reported health and vitality At six months, only anxiety and depression were different. Effect sizes were small for most outcomes; medium for depression. <i>Attrition:</i> 37.8% dropped out (intervention) and 22.7% dropped out (control group); no clear evidence that greater adherence led to a larger effect size.	The online self-help intervention failed to produce a sustained change in its primary outcome (wellbeing) over six months, and over one-third of participants failed to complete the intervention. However, although effect sizes were small, the intervention did produce a sustained reduction in anxiety and depression over six months compared to the control group. May bring some benefit to a non-clinical sample. <i>Limitations:</i> <ul style="list-style-type: none"> Significantly higher rate of attrition in experimental condition

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/ implications
Doughty et al. ¹	New Zealand	Uncontrolled before and after study Level III–3	50 consumers (Subset of 50 consumers and 75 health professionals from 187 workshop attendees) Consumers not separately analysed – of all participants: <ul style="list-style-type: none"> • 86% aged 31–60, mean age not stated • No details on gender Recruited via newsletters, newspapers, community noticeboards, online and through emails sent to government and non-government mental health organisations.	<i>Intervention:</i> Workshops on mental health recovery covered the following topics: <ul style="list-style-type: none"> • Recovery concepts, getting medical care and how to manage medications • Developing a set of tools to use as a part of daily living • Identifying triggers and developing a personal crisis plan Workshops delivered over one or two full days using a mix of didactic presentation, small group discussion and sharing of recovery experiences.	Data not separately reported by group – state no significant differences between consumers and health professionals. <i>Post-intervention:</i> <ul style="list-style-type: none"> • Significant change in attitudes and knowledge about recovery with a large effect size ($d = 0.82$) • 92% felt they had the knowledge and skills to develop a WRAP (wellness recovery action plan) • 87% felt they had the knowledge and skills to develop a WRAP for someone else • 86% felt the workshop would be useful in their work No evidence that two-day course was better than one.	The study suggests that a one-day workshop could be sufficient to improve health professionals' and consumers' attitudes and knowledge about mental health recovery. <i>Limitations:</i> <ul style="list-style-type: none"> • Small sample size • Non-consistent intervention delivery • Participants were volunteers

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/ implications
Dowrick et al. ²	UK	Uncontrolled before and after study Level III–3	18 adults with GP-diagnosed depression Most aged 35–64 years Similar numbers of men and women Participants volunteered to attend one of two weekly community reading groups	Participants attended a weekly community reading group based on a model of shared reading of serious literature in a group setting (in a GP surgery and mental health drop-in centre). All material is read aloud during the session and open-ended discussion is facilitated.	Fewer participants met criteria for ‘caseness’ of depression at 12-month follow-up compared to pre-test; however, reduction in mean levels of depression was not significant. No reduction in mean numbers of GP or hospital contacts. <i>Attrition:</i> Only 8 (44%) provided Patient Health Questionnaire (PHQ-9) scores at follow-up.	The study does not provide clear evidence in support of a weekly reading group as a means to treat depression, although it is difficult to draw conclusions from such a small sample size. Based on reduction in numbers of cases of depression, further research may be warranted. <i>Limitations:</i> <ul style="list-style-type: none"> • Small sample size • Outcome data collected from less than half of participants

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/ implications
Ebert et al. ⁶	Germany	RCT Level II	400 participants who met diagnostic criteria for a mental disorder according to the ICD-10 (200 intervention, 200 control) Mean age = 45 (SD = 9.39) 74.5% female Participants recruited from the study hospital	Following inpatient treatment, participants were randomised to 'usual care' (outpatient psychotherapy and group-based maintenance therapy) or experimental condition (usual care plus an internet-based maintenance treatment). <i>Intervention:</i> <ul style="list-style-type: none"> • Development of a detailed personal plan; completion of a structured web diary • Online support group; weekly written feedback from their web diary • Online monitoring of their symptoms 	Both groups experienced a significant decrease in symptom severity during inpatient treatment. Across the next 12 months, symptom severity remained low in the experimental group but increased in the control group. Greater intervention effect found for those with low vs high levels of education, high vs low positive outcome expectations and those with anxiety disorder vs mood disorder. <i>Attrition:</i> <ul style="list-style-type: none"> • 34.5% (n = 69) loss to follow-up at 12 months (intervention group) • 22% (n = 54) loss to follow-up at 12 months (control group) 	The study provides strong evidence that an internet-based maintenance therapy can provide sustained, significant improvements in symptom severity for a clinical mental health sample. <i>Limitations:</i> <ul style="list-style-type: none"> • Study relies on self-reported outcome measures • No mediators of the study effect investigated

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/ implications
Lambert et al. ³	UK	RCT Level II	<p>199 participants meeting DSM-IV criteria for panic disorder with or without agoraphobia (57 intervention, 60 control)</p> <p><i>Experimental</i></p> <p>Mean age = 40.1 (SD not reported)</p> <p>68.4% female</p> <p><i>Control</i></p> <p>Mean age = 38.6 (SD not reported)</p> <p>68.3% female</p> <p>Participants identified at 15 GP practices and invited to participate</p>	<p>Participants received occupational therapy-led intervention addressing diet, fluid intake, exercise and habitual lifestyle drug use and was delivered in four stages over a maximum of 10 intervention sessions over a 16-week period:</p> <ol style="list-style-type: none"> 1. Lifestyle review 2. Education 3. Specific lifestyle changes and monitoring 4. Review of the agreed lifestyle changes <p><i>Control:</i></p> <p>Routine GP care.</p>	<p>Significant behaviour changes were observed in the lifestyle arm at both 20 weeks and 10 months for physical exercise, diet and general fluid intake.</p> <p>Significant change in caffeine use between baseline and 20 weeks was non-significant between baseline and 10 months.</p> <p>No significant changes in behaviour in the GP care arm.</p> <p>Lifestyle arm reported significantly lower anxiety scores at 20 weeks, but not at 10 months; significantly greater proportion of control group patients were panic-free at 20 weeks but not at 10 months.</p> <p><i>Attrition:</i></p> <p>Intervention = 30% at 20 weeks follow-up; 40% at 10 months.</p> <p>Control = 37% at 20 weeks follow-up; 46% at 10 months.</p>	<p>Although there was evidence that the occupational therapy-led intervention impacted significantly on lifestyle behaviours and anxiety, there were significant limitations.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • Significant attrition across both study arms • Small sample size

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/ implications
Pratt et al. ⁹	US	Uncontrolled before and after study Level III–3	70 participants with serious mental illness (e.g. PTSD, schizophrenia, bipolar disorder) and chronic medical conditions Mean age 52.7 (SD = 10.6) 77% female Participants recruited from a community mental health centre	Participants received an automated telehealth intervention through: <ul style="list-style-type: none"> • An electronic device with large LCD screen programmed with a library of medical information specific to their health condition • Daily telehealth sessions consisting of reminders and educational content, supported by a nurse at the clinic 	<p>The majority of participants (83%) rated their ability to manage their intervention as “much better” post-intervention.</p> <p>Self-efficacy to manage depression (but not to get information on diseases) improved significantly from pre to post.</p> <p>Participants had lower diastolic BP post-intervention, but no change on any psychiatric symptoms, weight, systolic blood pressure, hospital stays or ED visits.</p> <p>Within the subgroup with diabetes (66% overall), improved fasting glucose and ED/medical visits.</p> <p><i>Attrition:</i></p> <p>Average adherence to telehealth sessions 71%.</p>	<p>Although the intervention was well accepted by participants and appeared to improve some cognitive indices, overall impact on health outcomes was low.</p> <p>There was some evidence that the intervention was more effective for those with diabetes.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • Small sample size • No comparison group • Heterogeneous sample and evidence of moderation

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/ implications
Quarero et al. ⁴	The Netherlands	RCT Level II	<p>152 participants with stress-related mental disorder (76 intervention, 76 control)</p> <p><i>Experimental</i></p> <p>Mean age = 43.7 (SD = 9.6) 61% female</p> <p><i>Control</i></p> <p>Mean age = 42.5 (SD = 10.4) 57% female</p> <p>Participants identified from medical records in participating primary care practices and invited to participate by mail.</p>	<p>Participants referred to physical therapists who designed an individually structured physical exercise program with eight scheduled meetings across 12 weeks.</p> <p>Participants in the control group received usual care from their GP.</p>	<p>No difference between the two groups on any of the scores of the SF36 (general health, mental health, social health and role functioning) or in distress or hours of work.</p> <p><i>Attrition:</i> Experimental = 43%.</p>	<p>In addition to apparent poor acceptability due to the high dropout rate, there was no evidence that referral to a physical therapist improves a range of outcomes for those with a stress-related mental disorder.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • Substantial attrition across both study arms • Small sample size

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/ implications
Ruwaard et al. ⁷	The Netherlands	Uncontrolled before and after study Level III–3	1500 clients of an online mental health clinic Mean age = 40 (no overall SD was reported) 67% female Participants needed to be seen by a GP or other mental health professional before starting treatment.	Participants received web-based, therapist-assisted CBT for depression, panic disorder, PTSD or burnout. All delivered online (other than diagnostic telephone interview). Manuals defined fixed sequences of homework assignments that implement common CBT interventions. In addition, participants received tailored feedback from therapists.	Large, short-term impact on several self-report measures including depression, panic disorder, burnout and anxiety. Changes sustained at 12 months Patient satisfaction high <i>Attrition:</i> 21% post-intervention, 33% at 6 weeks and 65% at 1 year.	The intervention appeared to have a significant, sustained impact on several psychological indices. However, although reported satisfaction was high, questions remain about the acceptability of the intervention due to the high attrition rate. <i>Limitations:</i> <ul style="list-style-type: none"> Substantial attrition across both study arms No comparison group.
van Straten et al. ⁸	The Netherlands	RCT Level II	213 participants interested in self-help treatment for symptoms of depression, anxiety and work-related stress (107 intervention, 106 control) No details on age reported 71.4% female Participants recruited through ads placed in local and national newspapers.	<i>Intervention:</i> Participants received a web-based, self-help intervention based on problem-solving therapy lasting four weeks and comprised of weekly emails with feedback from masters' level psychology students. Content included participants describing what really matters to them; writing down and categorising current worries and making a plan for the future. <i>Control:</i> Waiting list.	Significant improvements in depression (CES-D and MDI), anxiety (SCL-A and HADS), and burnout (MBI Personal Accomplishment factor). Effect sizes larger for those who completed the full course <i>Attrition:</i> Intervention = 45%	Those who received the intervention showed significant improvement compared to the control group, with evidence of a dose-response effect. However, acceptability appears to be an issue with the intervention given the high rate of attrition. <i>Limitation:</i> <ul style="list-style-type: none"> Substantial attrition in the experimental group.

Table A2: Mental health interventions – health professionals

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/ implications
Doughty et al. ¹	New Zealand	Uncontrolled before and after study Level III–3	75 health professionals (subset of 50 consumers and 75 health professionals from 187 workshop attendees) Health professionals not separately analysed – of all participants: <ul style="list-style-type: none"> • 86% aged 31–60, mean age not stated • No details on gender. Recruited via newsletters, newspapers, community noticeboards, online and through emails sent to government and non-government mental health organisations.	<p><i>Intervention:</i></p> <p>Workshops on mental health recovery covering the following topics:</p> <ul style="list-style-type: none"> • Recovery concepts, getting medical care and how to manage medication • Developing a set of tools to use as a part of daily living • Identifying triggers and developing a personal crisis plan <p>Workshops delivered over one or two full days using a mix of didactic presentation, small group discussion and sharing of recovery experiences.</p>	<p>Data not separately reported by group – state no significant differences between consumers and health professionals.</p> <p><i>Post-intervention:</i></p> <ul style="list-style-type: none"> • Significant change in attitudes and knowledge about recovery with a large effect size (d = 0.82) • 92% felt they had the knowledge and skills to develop a WRAP (wellness recovery action plan) • 87% felt they had the knowledge and skills to develop a WRAP for someone else • 86% felt the workshop would be useful in their work 	<p>The study suggests that a one-day workshop could be sufficient to improve health professionals' and consumers' attitudes and knowledge about mental health recovery.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • Small sample size • Non-consistent intervention delivery • Participants were volunteers

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/ implications
McCall et al. ¹⁰	Australia	Controlled before & after study Level III–2	14 GPs enrolled in a Graduate Certificate in General Practice Psychiatry course. <i>Intervention:</i> Mean age = 44 (SD not reported) 50 % female <i>Comparison (GPs who expressed interest but did not enrol):</i> Mean age = 36 (SD not reported) 50% female	Online course, 10 hrs/week for 42 weeks Seven subjects, including introduction to general practice psychiatry, psychotherapy, family therapy Primarily distance education using print-based materials supplemented with other media, including audiotaped discussions between course authors and videotape demonstrations of psychotherapeutic techniques.	<i>Immediate post-test:</i> <ul style="list-style-type: none"> Positive impact on knowledge of diagnosis of mental disorders compared to controls Improved knowledge of management of depression <i>Six-month follow-up:</i> <ul style="list-style-type: none"> Further increase in knowledge of diagnosis of mental disorders Improved knowledge of management of depression no longer evident Significant improvement in professional comfort and competency in detection and management of common mental disorders No significant effect on overall prescribing habits, non-drug management or referral of 'probable cases' Some evidence intervention group's patients improved to a greater extent on some clinical indicators 	The course had some impact on GPs' knowledge and attitudes; however, some of these improvements were not sustained over six months. There was no evidence that this translated into a change in behaviour and patient benefit appears limited. <i>Limitations:</i> <ul style="list-style-type: none"> Participants were not randomised Small sample size

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/ implications
Minas et al. ¹¹	Australia	Cross-sectional survey Level IV	598 GPs from areas of Melbourne with high proportion of non-English speaking residents Surveys sent to 2500 GPs (23.9% response rate) 28.4% registered in the Better Outcomes in Mental Health Care (BOiMHC) program Mean age not stated (14.2% aged between 30–39, 38.8% 40–49, 33.9% 50–59 and 13% 60+) 48.8% female	BOiMHC program aims to improve mental health care in general practice by: <ul style="list-style-type: none"> • Providing training to GPs • Supporting linkages to allied mental health practitioners and psychiatrists • Providing incentive payment for mental health work 	BOiMHC-registered GPs: <ul style="list-style-type: none"> • More positive attitudes towards mental health work • Improved support and funding arrangements for mental health care • Less likely to express a need for further training in assessment and diagnosis No overall difference between groups in expressed training needs, treating mental disorders and management approaches	The BOiMHC program appears to have some modest impacts on GP attitudes and practices. <i>Limitations:</i> <ul style="list-style-type: none"> • Low response rate • Lack of comparison group • No allocation to condition • Reliance on participant self-report

Table A3: Mental health interventions – systematic reviews

Citation	Aim/study question	Search strategy	No. of studies included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Fredericks et al. ¹⁴	To examine if patients who have had heart surgery engage in self-management behaviours following hospital discharge in the presence of anxiety and/or depression	Databases: CINAHL, MEDLINE, PubMed, EMBASE, Cochrane, HealthSTAR (2000–2011) Search terms: anxiety, depression, postoperative, self-management behavior, CABG, VR, postsurgical	16 studies	3783 participants	<p>Individuals with mild anxiety and/or depression engaged in higher number of self-management behaviours than those with moderate–severe levels.</p> <p>When levels changed from moderate–severe to mild, number of self-management behaviours engaged in increased. May be because performance of self-management behaviours is influenced by individual’s ability to acquire, retain, recall and implement knowledge, which in turn is influenced by psychological factors such as anxiety/depression.</p> <p>The more intense the presence of anxiety/depression, the less likely an individual will engage in activity.</p>	Instead of implementing interventions that address self-management behaviour performance during the home recovery period, clinicians should consider implementing interventions aimed at decreasing the level of severity of both anxiety and depression first, and then introduce self-management behaviour interventions gradually as anxiety and depression resolve.

Citation	Aim/study question	Search strategy	No. of studies included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Happell et al. ¹²	To review literature on health behaviour interventions to improve physical health of individuals diagnosed with a mental illness	Databases: CINHAI (via EBSCOhost), ProQuest, InformIT, PubMed (1960–Nov 2010) Search terms: programme OR service OR intervention OR randomi* AND mental illness OR mental health OR schizophrenia OR bipolar disorder OR mental disorder AND physical activity OR physical health OR smoking OR alcohol OR nutrition OR diet OR exercise	42 articles (16 RCTs)	5246 participants	Majority of studies reported improvements in health behaviours following interventions. Findings provide evidence for the positive effect of health behaviour interventions in improving the physical health of individuals diagnosed with a serious mental illness.	A focus on health behaviour interventions within the mental health nursing profession might lead to improvements in health behaviours and general health in consumers of mental health services.
Heffernan ¹³	To examine the evidence for the effectiveness of the IPS model of supported employment within the UK	Databases: BNI (British Nursing Index), CINAHL, Health Business Elite, HMIC (Health Management Information Consortium), MEDLINE, PsycINFO (2000 onwards) Search terms: population, intervention, methodology, patients, Individual, placement, support, trial, mental, IPS, study, unemployed, support*, employment, evaluat*, illness, assess, exam*	5 studies (2 RCTs)	The sample sizes varied from 40 to 451 participants	Overall quality of evidence was poor. There is evidence that interventions with high fidelity to the IPS model increase the proportion of patients engaged in work or education/training over the short- to medium-term (6–18 months follow-up)	Patient (motivation, employment history), service (integration with mental health teams), economic factors (local employment rates) affect employment outcomes. More research is needed to improve evidence base in relation to IPS within a UK context. Evaluation should focus on both the nature and quality of the employment gained, patient and service factors.

Table A4: Mental health interventions – study protocols

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Aelfers et al. ¹⁵	The Netherlands	Two-armed RCT 4-, 6-, 12-months follow-up	124 workers (62 per arm) with chronic mental fatigue or mild to moderate depression will be recruited from an occupational health service	<i>Intervention:</i> Face-to-face educational nurse-led intervention using minimal psychological intervention (MPI) in 1–10 sessions. <i>Control:</i> Usual care. Face-to-face educational intervention and follow-up with occupational physician(OP).	To evaluate the (cost-)effectiveness of an MPI in reducing symptoms of depression and chronic fatigue by addressing the following questions: 1. What is the effect of the occupational nurse-delivered MPI on the mental health status, quality of life and labour participation of workers with (symptoms of) mental fatigue and/or mild to moderate depressive symptoms in comparison with care as usual? 2. How do workers, occupational nurses and occupational physicians appreciate the intervention? 3. What possible barriers regarding implementation do they experience?
Arends et al. ¹⁶	The Netherlands	Cluster RCT 3, 6, 12 months follow-up	350 OPs aged 18–63 years old, employed in a paid job, diagnosed with a common mental disorder (CMD) given by their OP at the start of the sickness absence period experienced a period of sickness absence due to a CMD of at least two weeks, and who had planned return to work within two weeks will be recruited by OPs participating in the study.	<i>Intervention:</i> The OP-led intervention will consist of five steps: 1. Make an inventory of problems and/or opportunities encountered at work 2. Brainstorm on solutions 3. Write down the solutions and the support needed, and assess the applicability 4. Discuss the solutions with the line manager and make an action plan 5. Evaluate the action plan and the implementation of solutions. <i>Control:</i> Usual care.	To evaluate the effectiveness, cost-benefit and process of the SHARP-at work intervention compared to care as usual in preventing a relapse of sickness absence among employees who have returned to work after a period of sickness absence because of a CMD. To improve mental health and work functioning, and stimulate better coping mechanisms.

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Biesheuvel-Leliefeld et al. ¹⁰⁵	The Netherlands	RCT Week 1–8 3, 6, 9, 12, 15 months follow-up	268 patients (134 for intervention group and 134 for control group), aged 18–65 years, who have had at least 2 previous depressive episodes, are currently recovered (i.e. no diagnosis of depression according to the Structured Clinical Interview for DSM-IV [32] lasting longer than 8 weeks and no longer than 2 years), are fluent in reading and speaking Dutch, and who have access to the internet will be recruited through primary care practices.	<p><i>Intervention:</i></p> <p>Nurse-led self-help treatment based on preventive cognitive therapy consisting of:</p> <ul style="list-style-type: none"> • A face-to-face meeting with the nurse (30 minutes max.) prior to being administered self-help intervention • An 8-weekly modules (1.5 hour each week) self-help book which enabled patients to follow the treatment at home • Weekly filling out of the electronic Q-IDS-SR to monitor the severity of their depressive symptoms • 8 weekly concurrent nurse-led telephone contacts (15 minutes max.) <p><i>Control:</i></p> <p>Usual care as administered by primary care physician.</p>	<p>To evaluate whether nurse-led, cognitive treatment based self-help in addition to usual care is cost-effective in preventing recurrences for patients at high risk of recurrent major depressive disorder (MDD) in primary care compared to usual care alone.</p> <ul style="list-style-type: none"> • To examine whether the addition of nurse-led self-help to usual care for patients with recurrent MDD is effective in improving health-related quality of life; in reducing comorbid distress, anxiety and/or somatisation; in improving self-efficacy; and meets with patients' satisfaction.

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Nobis et al. ¹⁰⁶	Germany	Two-armed RCT 6-, 12-months follow-up	260 adults (130 for intervention group and 130 for the control group), who are 18 year or older, have German language skills, diagnosed with type 1 or type 2 diabetes 3 months prior to the study, have a depressed mood, have Internet access and an email address will be recruited through advertisement in diabetes patient journals and via a large-scale German health insurance company.	<p><i>Intervention:</i></p> <p>Online intervention (GET.ON Mood Enhancer Diabetes) via website, tablet or mobile phone and online support from trainer consisting of:</p> <ul style="list-style-type: none"> • 6 minimally guided web-based self-help sessions (45 minutes each), including homework assignments and mood diary: <ol style="list-style-type: none"> 1. Psychoeducation (session 1) 2. Behavioural activation (sessions 2 and 5) 3. Problem-solving (sessions 3 and 4) 4. Plan for the future (session 6) • Trainers (psychology graduates and psychologists) will provide support to participants via the internal messaging function on the GET.ON Mood Enhancer Diabetes platform for 3 hours total. <p><i>Control:</i></p> <p>Online intervention on general psycho-education about depression (i.e. information about symptoms and sources of help) based on the German S3-Guideline/National Disease Management Guideline Unipolar Depression.</p>	<p>To examine the efficacy and cost-effectiveness of a newly developed web-based intervention (GET.ON Mood Enhancer Diabetes; GET.ON M.D.) for people with diabetes and comorbid depressive symptoms by finding supportive evidence for the following hypotheses:</p> <p>A minimally guided, diabetes specific web-based intervention with mobile phone support, (online program GET.ON Mood Enhancer Diabetes) will have significantly lower levels of depressed mood than the control group.</p> <p>The GET.ON. M.D. will be a cost-effective program for reducing depressive symptoms of people with diabetes in comparison to the control group.</p>

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
O'Sullivan et al. ⁹⁵ Process evaluation	Australia	Quantitative patient ratings survey and qualitative evaluation	Individuals with mental health issues accessing services through a mental health service referred to the program by their case managers or doctors. All three programs have been completed at least twice, treating 40 patients in total, and 35 satisfaction surveys have been evaluated.	Three program modules were designed, addressing the topics of nutrition and healthy eating, physical health, and community based activities and interests: <ul style="list-style-type: none"> • Module 1: nutrition & healthy eating • Module 2: looking after your physical health • Module 3: activities & interests 	Intervention aims: <ol style="list-style-type: none"> 1. To meet the specific health and lifestyle needs of mental health patients 2. To involve patient input in both design and evaluation phases 3. To contain practical, activity-based learning to enhance information retention and encourage positive behaviour change 4. To involve partnerships with relevant local health and lifestyle services Paper aims: <ol style="list-style-type: none"> 1. Justification and overview of program development 2. Provide process data of participant satisfaction and recommendations for program improvement

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Rebergen et al. ¹⁷	The Netherlands	RCT 1-year follow-up	214 participants (107 for the intervention and 107 for the control group), who have mental health problems according to the diagnosis of the occupational physician (OP), on sick leave at the moment of inclusion and whose sick leave period did not start before 2002 will be recruited by OPs.	<p><i>Intervention:</i></p> <p>3 face-to-face sessions by OPs according to the guideline:</p> <ul style="list-style-type: none"> • Early and activating guidance by the OP is promoted • Simplified classification of mental health problems • OP counselling employees with adjustment disorders and work-related problems • OP evaluates and intervenes when recovery stagnates <p><i>Control:</i></p> <p>Usual care, with minimal involvement of the OP and, if applicable, access to treatment by a psychologist upon judgment of OP. Psychological therapy offered was based on protocols of the Dutch Institute of Work and Stress.</p> <p><i>Co-interventions:</i></p> <p>Intervention & control group participants with PTSD referred to specified clinic for treatment.</p>	<ol style="list-style-type: none"> 1. The intervention will lead to health gain for employees on sick leave due to common mental health problems. 2. The intervention will additionally lead to relatively more treatment satisfaction of the employee, the employer and the OP. 3. A decrease of productivity loss and prevention of expensive referrals to secondary care will reduce costs.

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
van Beurden et al. ¹⁸	The Netherlands	Two-armed Cluster RCT 3, 6, 12 months follow-up	232 workers (116 for intervention group and 116 for control group), aged 18–65 years, with a CMD as the primary reason for sick leave diagnosed by an OP, on sick leave when selected from the registration system of the occupational health service (OHS) after the first meeting with the OP, and adequate command of the Dutch language will be recruited by participating OPs.	<p><i>Intervention:</i></p> <p>OP-led counselling of sick listed workers according to the Dutch national guideline 'Management of mental health problems of workers by OPs consisting of:</p> <ol style="list-style-type: none"> 1. Problem orientation and diagnosis 2. Intervention/treatment: the OP acts as case manager by monitoring and evaluating the process of recovery 3. Relapse prevention 4. Evaluation <p><i>Control:</i></p> <p>Usual care provided by OPs.</p>	To evaluate the effect of guideline-based care on the full return to work of workers who are sick listed due to common mental disorders CMDs.

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
van Dijk-de Vries et al. ⁴⁶	The Netherlands	Cluster RCT 3, 6, 12 months follow-up	236 patients, aged 18 years or older, are treated for type 2 diabetes and/or coronary heart disease (CHD) in primary care, and have sub-threshold depressive symptoms (a score of 6 or more on the Patient Health Questionnaire-9) without fulfilling the criteria for major depression according to the DSM-IV, as measured with the Mini International Neuropsychiatric Interview, will be recruited from general practices that consent to participate.	<p><i>Intervention:</i></p> <p>Face-to-face nurse-led indicated stepped-care program for depressive symptoms. Intervention includes four evidence-based treatment steps, lasting 3 months each:</p> <ol style="list-style-type: none"> 1. Watchful waiting 2. Guided self-help treatment 3. Problem-solving treatment 4. Referral to the GP <p><i>Control:</i></p> <p>They will not receive any training and will provide care as usual to all their patients according to existing clinical guidelines, and will have unrestricted access to care as normally provided by their GP.</p>	To evaluate the cost-effectiveness of a nurse-led indicated stepped-care program to prevent depression among primary care patients with type 2 diabetes and/or CHD and sub-threshold depression in comparison with usual care.

Table A5: Chronic disease interventions – consumers

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Adriaanse et al. ¹⁹	The Netherlands	Two single-arm studies Level III–3	64 participants with type 2 diabetes Mean age = 61.05 (SD = 7.31) 43.8% female Recruited by GPs from four different practices and screened for inclusion via telephone.	<i>Arm 1:</i> Fantasise about the positive future (indulging). <i>Arm 2:</i> Three-part mental contrasting exercise. 1. Determine the most positive aspect of reaching your weight-loss goal. 2. Elaborate on thoughts, experiences and feelings that you can relate to this positive aspect. 3. Determine and elaborate on the most important obstacle standing in your way of achieving your weight-loss goal.	At one-month follow-up, participants in the mental contrasting condition had improved their diabetes self-management and dieting behaviour by a larger extent than participants who merely indulged in the positive future [$F(1, 62) = 4.50, p < 0.04$] and dieting behaviour, $F(1,62) = 4.84, p < 0.03$). <i>Attrition:</i> 3 participants dropped out during the first session, 2 did not fill out time 1 questionnaire, and 4 'held low expectations'.	Adding a mental contrasting exercise to usual care may be a highly feasible, low-cost alternative to promote diabetes self-management (but confirmatory research is needed). <i>Limitations:</i> <ul style="list-style-type: none"> • Small sample • Only participants motivated to lose weight were included • No control group

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Chen et al. ²⁰	Taiwan	RCT Level II	60 asthma outpatients <i>Intervention:</i> Mean age = 52.20 (SD = 12.74) 63% female <i>Control:</i> Mean age = 53.97 (SD = 13.64) 63% female Recruited from patients who visited the chest medicine division of a medical centre in Kaohsiung City between March 2009 & Jan 2010.	<i>Intervention:</i> Self-efficacy intervention program: <ul style="list-style-type: none">15–20 minute DVDbooklet on self-efficacy for adult asthmatic patientsAsked to share their illness experience with support groupsMedical follow-ups by telephone. <i>Control:</i> Usual care (health education administered by outpatient department).	Significant improvement in: <ul style="list-style-type: none">Self-care behaviours: medication adherence, self-monitoring, avoidance of antigens, regular follow-up visits and regular exerciseParticipant self-efficacy for asthma attack prevention and management during asthma attacks. <i>Attrition:</i> Nil.	Programs which include both self-care skills and self-efficacy appear to be effective in improving attitudes and behaviours among adults with asthma. Study authors suggest nursing staff be educated about role of self-efficacy and trained in delivery of self-efficacy interventions. <i>Limitations:</i> <ul style="list-style-type: none">Small sample sizePrimary focus on self-report measuresNo long-term follow-up

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Clark et al. ²¹	UK	RCT Level II	100 participants with type 2 diabetes Mean age = 59.5 years (SD not reported) 42% female (not reported separately by intervention vs control) Recruited from a diabetes centre via computer database.	<i>Intervention:</i> <ul style="list-style-type: none"> Completed assessment self-report measures related to their eating patterns and level of physical activity Personalised a self-management program, including one dietary and one physical activity goal Engaged in motivational interviewing session to discuss discrepancies between current behaviour and desired goals Received a goal-setting form and healthy eating booklets. <i>Control:</i> Usual care.	Self-reported improvements in fat intake and (to a lesser extent) lifestyle physical activity levels. Better weight maintenance than control group. 3-month follow-up: Significant reduction (1.32 cm) in waist circumference for the intervention group compared to significant increase in control group (1.73 cm). 12-month follow up: Difference in waist circumference between intervention and control group was 0. <i>Attrition:</i> 6 participants were lost: 2 from the intervention group (1 deceased) and 4 from the control group (2 deceased).	While, on average, intervention participants had not lost weight at the 12-month assessment, they had better weight maintenance than the control group (who gained weight during this period). The study authors suggest approach could be extended to other patient groups who would benefit from lifestyle changes. <i>Limitations:</i> Reliance on self-report measures for fat intake and physical activity.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Feifer et al. ²⁸	US	Case-control Level III-2	3450 participants with asthma (intervention) who were eligible members of prescription benefit plans managed by Medco Health; and 3450 (control) who were members of other plans Mean age = not reported (SD not reported) 56% female (not separately reported for intervention vs control) Recruited from prescription benefit plan membership	<i>Intervention:</i> Patients and their physicians were mailed educational materials (i.e. asthma therapy, self-management and trigger avoidance) over a 12-month period: <ul style="list-style-type: none"> • 5 workbooks (mailed at 2-month intervals) • 2 newsletters (mailed at 6-month intervals). 	Intervention group: Higher rate of commencement of controller (reliever) (20.7% versus 18.1%, $p < 0.001$). Higher prescription fill rate (figures not reported, $p < 0.0001$). Program participants reported significant: <ul style="list-style-type: none"> • Improvements in asthma-related QoL ($p < 0.05$) • Improvements in self-management skills ($p < 0.05$) • Decrease in medical office visits ($p < 0.05$) and emergency room visits ($p < 0.01$). <i>Attrition:</i> Overall 1% dropped out of the program. From a random sample of program participants, 39% did not complete follow-up survey at 12 months.	Significant impacts on QoL, medical utilisation and self-management skills can be achieved through a population-based program that uses educational mailings as its principal intervention. The substantial sample size and controlled nature of the study design increases confidence that these outcomes are a product of the educational intervention.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Gibson et al. ²²	US	RCT Level II	<p>65 participants with diabetes (33 intervention, 32 control)</p> <p><i>Intervention:</i></p> <p>Mean age = 56 (SD not reported)</p> <p>40% female</p> <p><i>Control:</i></p> <p>Mean age = 61 (SD not reported)</p> <p>35% female</p> <p>Recruited from DVA Medical Center primary care clinics, diabetes education and weight management classes, diabetes exercise group at University, community diabetes health fair, and email to a diabetes-related listserv.</p>	<p><i>Intervention:</i></p> <p>Facilitated by the principal investigator (single session):</p> <ol style="list-style-type: none"> 1. Presentation of effects of walking on the glucose curve (simulation) 2. Drawing task (draw curve if participants walked) 3. View expected acute outcome 4. Preparation for second drawing task 5. Second drawing task (draw curve if participant walked for 150 min/week) 6. View intermediate outcome (shown twice) 7. Write an action plan for walking over the coming week. <p><i>Control:</i></p> <p>Steps (1), (2), (4)</p>	<p>Intervention participants increased their walking time more than control participants (mean effect of intervention = increase of 61 minutes after adjusting for baseline walking, age and baseline behavioural intent).</p> <p>Age and baseline behaviour intent were not significant predictors of the change in walking.</p> <p>On average, after viewing the simulation:</p> <ul style="list-style-type: none"> • The beliefs of individuals with negative baseline beliefs became more positive • The beliefs of those with overly optimistic baseline beliefs became more negative. <p>Both groups increased behavioural intentions and knowledge.</p> <p><i>Attrition:</i></p> <p>Not reported</p>	<p>Findings highlight the potential for translation of specific evidence from psychology literature into design of informatics-based behavioural interventions.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • Small sample size • Self-report (needs to be confirmed with objective measures).

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Kaya et al. ²⁷	Turkey	Two single-arm studies Level III-3	63 asthma patients <i>Peak flow meter (PFM) group (n=31):</i> Mean age = 44.46 (SD = 10.67) 80.6% female <i>Symptom-based group (n=32):</i> Mean age = 42.50 (SD = 10.39) 78.1% female Recruited from asthma clinic.	Random allocation to the following physician-led face-to-face training groups: <i>Intervention 1:</i> PFM-based written self-management education program group. <i>Intervention 2:</i> Symptom-based written self-management education program group.	At 3-month follow-up: <ul style="list-style-type: none"> QoL scores for both groups improved significantly Anxiety scores increased, especially in PFM group, but did not impact on compliance Compliance levels were higher in PFM group (p = 0.04) Patients with worse compliance had higher depression scores Patients with good compliance levels had higher mental health (SF-36) scores At 6-month follow-up: <ul style="list-style-type: none"> Percentage of patients having good compliance decreased (more so in symptom-based group) Control parameters better in the PFM group (lower incidence of antibiotic treatment episodes, p = 0.01; and unscheduled hospital admissions, p = 0.002). <i>Attrition:</i> Not reported.	Both interventions were effective in the short-term; although the PFM arm was more effective, compliance levels declined at 6-month follow-up, suggesting the need for ongoing reinforcement. Self-management plans may not be as effective for patients who are already anxious and become more anxious when made responsible for their own care. <i>Limitations:</i> <ul style="list-style-type: none"> Small sample size No control group

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
King et al. ³¹	US	RCT Level II	335 participants with diabetes (174 intervention, 161 control) <i>Intervention:</i> Mean age = 61.9 (SD = 11.3) 50% female <i>Control:</i> Mean age = 61.0 (SD = 11.0) 51.3% female Recruited from 42 primary care physicians.	<i>Intervention:</i> <ul style="list-style-type: none"> • Computer-assisted, tailored self-management intervention • Interactive CD-ROM technology • One-on-one health counselling • Telephone follow-up support between visits. <i>Control:</i> <ul style="list-style-type: none"> • Interactive computerised health risk appraisal (HRA) at first visit • Feedback and brief generic health counselling • No subsequent follow-up. 	Analyses of rote (i.e. jogging, stretching, resistance training), purposeful sport, and purposeful lifestyle physical activity (i.e. housework) suggested that the gains were achieved in the intervention group by an average proportional reduction in lifestyle physical activity (from a proportion of .74 of all activity at baseline to .63 at 2 months) and an increase in rote physical activity (from a proportion of .24 of all activity at baseline to .35 at 2 months). At 2 months, cluster 3 (mostly lifestyle physical activity at baseline) increased rote physical activity by an average 523 calories per week and reduced lifestyle physical activity by an average 162 calories per week. <i>Attrition:</i> 8.6% (n = 15) dropped out of intervention group and 6.8% (n = 11) out of control group.	Significant treatment effect, despite differences between the seven interventionists, suggests this approach has potential to work for a variety of individuals and could be delivered by a variety of staff. Understanding more about patient behavioural patterns may enable healthcare workers to better tailor activity plans. 2-month follow-up suggests improvements to physical activity may or may not be maintained, thus more frequent and extended follow-up assessments are needed. <i>Limitations:</i> Self-reports of activity levels.
Kuijer et al. ²³	The Netherlands	Cohort study Level III–2	70 participants with asthma (41 intervention, 29 control) 55 participants with	<i>Intervention:</i> Nurse-led group sessions of 6–8 patients, covering: <ul style="list-style-type: none"> • Maintaining a good physical 	<ul style="list-style-type: none"> • No intervention effects on self-efficacy, self-care activities or proactive coping. • No intervention effects for quality of life using pre-test-post-test 	Small, if any, intervention effects. Further research needed to investigate differential intervention effects on asthma and diabetes patients.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
			<p>diabetes (32 intervention, 23 control)</p> <p>Intervention: (n=73)</p> <p>Control: (n=52)</p> <p>Demographics at baseline:</p> <p><i>Asthma:</i></p> <p>Mean age = 41.7 (SD = 12.14)</p> <p>64% female</p> <p>Control: (n = 23)</p> <p>Mean age = 46.4 (SD = 12.42)</p> <p>78% female</p> <p>Demographics at baseline:</p> <p><i>Diabetes:</i></p> <p>Intervention: (n=26)</p> <p>Mean age = 44.6 (SD= 11.64)</p> <p>46% female</p> <p>Control (n=16)</p> <p>Mean age = 37.8 (SD= 10.99)</p> <p>44% female</p> <p>Recruited from</p>	<p>condition</p> <ul style="list-style-type: none"> Preventing an exacerbation Recognition of first symptoms and taking adequate action Coping with negative emotions in relation to being chronically ill Giving and seeking social support from partner, neighbours and colleagues. <p><i>Control:</i></p> <p>Standard care (asthma) involved one scheduled visit to lung specialist every 6 months</p> <p>Standard care (diabetes) involved one (or more if needed) visit to internist and two visits (or more if needed) to diabetes nurse annually.</p>	<p>comparisons, although a 'then-test' procedure showed positive intervention effects on global quality of life and physical health for asthma patients but not diabetes patients.</p> <ul style="list-style-type: none"> Association between optimism and change in global quality of life was significant for experimental group but not control group. <p><i>Attrition:</i></p> <p>Follow-up assessment included 45 asthma patients (38% dropped out) and 33 diabetes patients (37% dropped out).</p>	<p><i>Limitations:</i></p> <ul style="list-style-type: none"> Small sample size Questionable use of the 'then-test' procedure.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
			outpatient departments of various hospitals			
Poureslami et al. ²⁹	Canada	Pseudorandomised controlled trial Level III-2	85 adult asthma patients (42 Chinese and 43 Punjabi) Mean age = 62.9 (SD = 15.3) 50.5% female Recruited from a university-based pulmonary medicine clinic.	<i>Intervention:</i> Random assignment to one of four groups: 1. View physician-led video 2. View patient-generated community video 3. View both videos 4. Read pictorial pamphlet (comparison group).	3-month follow-up: Significant improvements in knowledge among all participants. Numerous demographic differences including: <ul style="list-style-type: none"> Chinese patients > increase than Punjabi patients on some variables but reverse for others Patients younger than 60 years > improvements in knowledge of asthma symptoms and factors that could worsen asthma Females > improvements than males in understanding of physicians' instructions, but Punjabi males > improvements in asthma knowledge than Punjabi females <i>Attrition:</i> 3 excluded and 4 discontinued.	<i>The authors conclude:</i> When patients received information from different sources, particularly AV formats, knowledge of asthma and understanding of physicians' instructions improved significantly. Involving community can facilitate development of relevant and practical educational interventions for patients from different ethnic and cultural communities. <i>Limitations:</i> <ul style="list-style-type: none"> Small sample sizes (for comparing ethnic background, gender and age).

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Sinclair et al. ²⁵	US	RCT Level II (Intervention group compared to a waiting list control)	82 participants with diabetes (48 intervention and 34 control) <i>Intervention:</i> Mean age = 53 (SD = 12) 63% female <i>Control:</i> Mean age = 55 (SD = 10) 62% female Recruited from two community-based health centres and one Native Hawaiian community organisation.	<i>Intervention:</i> Partners in Care – 12 1-hour face-to-face sessions delivered by peer educators, culturally relevant activities to help participants gain knowledge and skills related to blood glucose monitoring, adherence to medication therapy, healthy eating, physical activity and stress reduction. <i>Control:</i> Waiting list.	At 3-month follow-up: Significant baseline adjusted differences for : <ul style="list-style-type: none"> • Understanding of HBA1c (p < 0.0001) • Performing diabetes self-management (p < 0.0001). Attrition: 29% drop -out rate for intervention group (higher in younger participants).	A culturally adapted diabetes self-management intervention of short duration was an effective approach to improving glycaemic control among Native Hawaiian and Pacific Islanders. Future studies should include methods to facilitate younger individuals' participation. <i>Limitations:</i> <ul style="list-style-type: none"> • No long-term follow-up data • High attrition (especially among younger participants).

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Steuten et al. ²⁶	The Netherlands	One group, pre-test/post-test Level IV	975 participants (658 with asthma, 317 with COPD) <i>Asthma:</i> Mean age = 54 (SD = 17) 59% female <i>COPD:</i> Mean age = 61 (SD = 14) 44% female Recruited from general practices and outpatient departments.	<i>Intervention:</i> Disease management program, involving: <ul style="list-style-type: none"> • Central coordination • Assigning patients to a GP • Respiratory nurse or pulmonologist • Data collection with annual feedback. 	Improvements in: <ul style="list-style-type: none"> • Quality aspects of care, disease control, self-care behaviour, smoking status, disease-specific knowledge and patients' satisfaction • Health utility (COPD patients only) • Medical costs (decrease in number of non-routine consultations by 28%, and hospitalisation by 50% – but increase in costs for medication) • Sick leave days due to asthma or COPD (55% decrease) No change in: <ul style="list-style-type: none"> • Lung function. <i>Attrition:</i> 30% by 12-month follow-up (primary dropout reason: unwillingness to complete questionnaire).	Disease management designed around a collaborative practice team in which nurse specialist plays a key role was effective in bringing about changes in knowledge, attitudes and behaviours. <i>Limitations:</i> No long-term follow-up data, thus inability to detect clinically relevant changes for clinical parameters.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Tousman et al. ²⁴	US	One group, pre-test/ post-test Level IV	21 participants with asthma 5 males (mean age = 56; SD not reported; range 19–74 years) 16 females (mean age = 61; SD not reported; range 20–82 years) Recruited from north central Illinois through physician referrals and community asthma outreach events.	<i>Intervention:</i> 72-hour weekly face-to-face sessions facilitated by a variety of health professionals (psychologist, nurse, allergist, social worker and respiratory therapist) were as follows: <ul style="list-style-type: none"> • Week 1: pre-course surveys and autobiographical accounts to group on their asthma • Weeks 2–6: individual status reports followed by group discussion of a new topic and homework. 	Post-intervention – statistically significant improvement in: <ul style="list-style-type: none"> • Knowledge • Self-management behaviours (frequency of PEF measurement, daily controller medication use, removing/reducing triggers and reading about asthma) • Asthma control • Blood pressure • Depression • Self-efficacy • Quality of life. <i>Attrition:</i> Not reported.	Nurses working in collaboration with other healthcare practitioners may improve knowledge and behavioural outcomes. <i>Limitations:</i> <ul style="list-style-type: none"> • Small sample size • No control group • Primarily relies on self-report data.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Williams et al. ³²	US	RCT Level II	866 participants with type 2 diabetes (469 intervention and 417 control) <i>Intervention:</i> Mean age = 61.48 (SD = 12.64) Gender details not reported <i>Control:</i> Mean age = 64.63 (SD = 12.42) Gender details not reported Recruitment method not stated.	<i>Intervention:</i> Computer-assisted intervention to improve patient-centred aspects of diabetes care, including individualised action plans, reviews of patient self-care goals, medical care needs, problem-solving strategies and follow-up calls. <i>Control:</i> Touch screen assessment and printout of general health risks.	Intervention increased patient perception of autonomy support relative to control condition. Greater autonomy support from providers was experienced by patients in the intervention group than patients in the usual care condition; significant at 12 months (p < .05). Change in perceived competence partially mediated the effects of increased autonomy support on the change in lipids, diabetes distress and depressive symptoms.	Intervention may have been autonomy supportive because interactive computer program assessed patient concerns and preferences in setting collaborative goals without being perceived by patient as judgemental or controlling; strong emphasis on patient choice in developing action plans; and physician and care manager discussed and followed up on such plans. <i>Limitations:</i> <ul style="list-style-type: none">Not all data reported (or reported in a way that allowed for clear interpretation of results).

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Wu et al. ³⁰	Australia	RCT Level II	20 cardiac patients with type 2 diabetes (numbers in intervention and control not stated) Age and gender details not reported Recruited from a coronary care unit.	<i>Intervention:</i> Cardiac-diabetes self-management program (CDSMP): <ul style="list-style-type: none"> • Program commencement in the coronary care unit setting • Telephone follow-up • Text message reminders. <i>Control:</i> Usual care	<ul style="list-style-type: none"> • Significant improvements in self-efficacy for the intervention group. • Reported 'non-significant improvement' for both groups in knowledge, self-care behaviour, fatigue and depressed levels following implementation of the CDSMP. Participants reported that they felt supported by health professionals; text reminders provided some usefulness towards continuing their daily self-management activities.	<p>Less volume of written educational materials appears to be beneficial and to increase usage of information given.</p> <p>Future effectiveness study needed to provide further evidence of the benefits of the CDSMP.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • Small sample size.

Table A6: Chronic disease interventions – health professionals

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Ciccione et al. ³⁴	Italy	Single-arm study with pre-test/post-test Level IV	1160 participants; over half were diagnosed with more than one condition Mean age = 64 (SD = 11.12) 48% female Recruited via enrolment of patients by GPs from 20 offices.	Care managers placed into offices of GPs and family physicians to create 'teams' consisting of physicians, care managers, specialists and patients. Used an evidence-based, internet decision support tool designed to achieve better coordination of care and improve outcomes by providing an electronic patient record with automatic alerts and reminders, tools for monitoring behaviour change, a resource library and summary reports that could facilitate specialist visits.	During follow-up period: Increase from 39.4% to 80.7% of patients who had adopted a good quality diet. Statistically significant change in BMI, low-density lipoprotein (LDL), systolic blood pressure and total cholesterol. Increase in percentage of patients who met the recommended target values. <i>Attrition:</i> 54 patients dropped out.	The changes induced by the 'partnership' model have the potential to reduce hospitalisations and emergency care costs, as well as leading to greater satisfaction among patients, doctors and care managers. <i>Limitations:</i> • No control group.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Feifer et al. ^{28,12}	US	Case control Level III-2	3450 participants with asthma (intervention); and 3450 controls Recruited from prescription benefit plan membership Concurrently targeted patients' physicians	<i>Intervention:</i> Patients and their physicians were mailed educational materials (i.e. asthma therapy, self-management and trigger avoidance) over a 12-month period	Intervention group: <ul style="list-style-type: none"> • Higher rate of commencement and usage of controller (reliever) medication • Increased asthma-related QoL (p < 0.05) • Improvements in self-management skills • Decrease in medical office and emergency room visits. <i>Attrition:</i> 1%	While further research would be needed to confirm this, it is feasible that the concurrent targeting of GPs contributed to the intervention's success.

¹² See Table A5 for further details.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Sieber et al. ³³	US	Block randomised controlled trial Level III-1	Diabetic patients of 22 physicians <i>Full intervention</i> (n = 270) Mean age = 55 (SD not reported, age range = 21–86 years) 49% female <i>Intervention lite</i> (n = 294) Mean age = 58 (SD not reported, age range = 23–94) 54% female <i>Usual care</i> (n = 350) Mean age = 62 (SD not reported, age range = 23–96) 53% female	<i>Full intervention:</i> <ul style="list-style-type: none"> Mailed letter Three phone calls from a health coach [max 35 patients per physician]. <i>Intervention lite:</i> <ul style="list-style-type: none"> Mailed letter. <i>Control:</i> <ul style="list-style-type: none"> Usual care. Intervention only – each health coach worked closely with a physician.	Patients targeted by outreach health coach (compared to usual care) more likely to: <ul style="list-style-type: none"> View the video Be seen by their physician within 6 months Have disease-relevant laboratory tests performed. <i>Attrition:</i> Not reported.	Collaborative approach allowed greater patient activation and synchrony between the actively involved physician and motivated patient. Likely to support sustained efforts of engagement by both physician and patient, and thus better long-term outcomes. <i>Limitations:</i> <ul style="list-style-type: none"> Short follow-up period Possible pre-existing differences between the three groups.

Table A7: Chronic disease interventions – systematic reviews

Citation	Aim/study question	Search strategy	No. of studies Included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Chomutare et al. ³⁷	To study features of mobile applications for diabetes care in contrast to clinical guideline recommendations for diabetes self-management	Databases: MEDLINE, ScienceDirect, ACM Digital Library, IEEE Xplore Digital Library, Google Scholar, DBLP Computer Science Bibliography (2006 onwards) Search terms: diabetes AND (mobile OR PDA OR cell OR phone OR application) Online stores for mobile applications Search terms: diabetes OR glucose	36 studies from online journal databases 101 applications from online markets	N/A	Few applications were sensitive to users' age/gender; important specific factors for special user groups, e.g. pregnant women, were largely missing. Education only featured in a few diabetes-related mobile apps. Small % of apps has social media, suggesting that influence of social media on the development of diabetes mobile apps is so far negligible. Most online market apps are based on manual data entry, while 62% of the apps found in the literature used wireless automatic data acquisition. Manual data input increases erroneous input and may lower compliance.	Gaps between evidence-based recommendations and functionality used in study interventions or found in online markets. Results confirm personalised education as an under-represented feature in diabetes mobile applications.

Citation	Aim/study question	Search strategy	No. of studies Included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
de Jong et al. ³⁸	To review use and usability of patient-provider asynchronous (non-concurrent by email or discussion board) communication for chronically ill patients and the effects of such communication on health behaviour, health outcomes and patient satisfaction	Databases: PubMed and Embase (2001–2013) Search terms: chronic disease, telecommunications OR internet OR telemedicine OR health services OR delivery of health care OR medical information OR electronic mail, self-care, self-efficacy	15 studies	The sample sizes varied from 0–50, 50–100, 100–150, and more than 150.	Patients' knowledge re their chronic condition increased. Specific questions as well as wanting to communicate about feeling ill. Decreased visits to physician shown in two studies. Increases in self-management/self-efficacy for patients with back pain, dyspnoea and heart failure were found. Positive health outcomes were shown in 12 studies, where the clinical outcomes for diabetic patients and for asthmatic patients improved. Physical symptoms improved in five studies. Five studies generated a variety of positive psychosocial outcomes.	Effect of asynchronous communication is not shown clearly. Patients seem to be interested in using email. Patients are willing to participate and are taking the initiative to discuss health issues with their providers. Authors recommend further testing of the effects of asynchronous communication on self-management in chronically ill patients.
Denford et al. ³⁵	To update previous systematic reviews of interventions targeting asthma self-care in adults with asthma, and to examine association between the use of specific behaviour change techniques and intervention effectiveness	Databases: Cochrane Central Register of Controlled Trials (CENTRAL), Embase, CINAHL, MEDLINE, PsycINFO, clinical trials registry (Jan 1998–Oct 2012) Search terms followed the population, intervention, comparator, outcome, and study design (PICOS) principal, and were adapted for each database	38 RCTs	7883 patients	Interventions targeting asthma self-care reduced symptoms SMD = -0.38 ($-0.52, -0.24$) and unscheduled healthcare use OR = 0.71 (0.56–0.90) and increased adherence to preventive medication OR = 2.55 (2.113.10). Meta-regression analyses found that active involvement of participants was associated with a reduction in unscheduled healthcare use (OR = 0.50 vs. 0.79). Inclusion of stress management techniques was associated with an increase in asthma symptoms (SMD = 0.01 vs. -0.44).	Interventions targeting asthma self-care are effective. Active involvement of participants is associated with increased intervention effectiveness, but the use of stress management techniques may be counterproductive. Taxonomy-based systematic reviews using meta-regression have potential for identifying techniques associated with increased effectiveness in behavioural interventions.

Citation	Aim/study question	Search strategy	No. of studies Included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Jackson et al. ³⁹	To determine how emerging interactive IT has been used to enhance care for adults with type 2 diabetes; to assess the inclusion of ethnic minority populations; to report costs associated with the interventions	Databases: PubMed, PsycINFO, CINAHL, Cochrane Library (through 2003) <i>Diabetes Care</i> journal (Jan 1990–Feb 2004) Search terms: diabetes or noninsulin-dependent diabetes AND internet, internet-based, electronic, intervention, RCT, therapy, education, programs, techniques, impact of, and behavior	26 studies (27 reports) (14 RCTs)	Median sample size 165 (28–6469) for patients and 37 (15–67) for providers	6 of 14 interventions demonstrated moderate to large significant declines in HbA1c levels compared with controls. Most studies reported overall positive results and found that IT-based interventions improved healthcare utilisation, behaviours, attitudes, knowledge and skills.	Emerging IT may improve diabetes care. Further research needed to characterise long-term benefits (> 1 year). Methods to evaluate clinical outcomes and determine cost-effectiveness of using IT need to be established.

Citation	Aim/study question	Search strategy	No. of studies Included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Morrison et al. ⁴⁰	To summarise current knowledge, evidenced through existing systematic reviews, of the effectiveness and implementation of digital self-management support for adults and children with asthma; to examine what features help or hinder the use of these programs	Databases: MEDLINE, MEDLINE In-Process, Embase, CINAHL, PsycINFO, Cochrane Database of Systematic Reviews, DARE, CENTRAL, Health Technology Assessment, NHS Economic Evaluation Database, ERIC, SCI, SSCI, DoPHER, TRoPHI. hand-searching of <i>Patient Education and Counseling</i> and <i>Primary Care Respiratory</i> journals (July 2011 onwards) Search terms included 3 broad areas: (1) asthma and related terms, (2) online/computerised and related terms, and (3) self-care/self-management, patient experience, qualitative, and related terms; and were adapted for each database	10 systematic reviews presented results from 19 RCTs	Sample sizes ranged from 20 to 378	Meta-analysis was not attempted due to heterogeneity and inadequate information provision within reviews. No evidence of harm from digital interventions. All RCTs that examined knowledge (n = 2) and activity limitation (n = 2) showed improvement in the intervention group. Digital interventions improved markers of self-care (5/6), quality of life (4/7), and medication use (2/3). Effects on symptoms (6/12) and school absences (2/4) were equivocal, with no evidence of overall benefits on lung function (2/6) or health service use (2/15). Intervention descriptions were generally brief, making it impossible to identify which specific 'ingredients' of interventions contribute most to improving outcomes.	Few interventions were supported by robust theoretical frameworks. Digital interventions poorly described; there is insufficient information about barriers and facilitators to their uptake and utilisation. Patient perspectives have been largely ignored in currently available reviews. Detailed quantitative systematic review of digital asthma interventions and an examination of the primary qualitative literature are needed, as well as greater emphasis on economic analysis within trials.

Citation	Aim/study question	Search strategy	No. of studies Included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Stellefson et al. ⁴¹	To review the planning, implementation and overall effectiveness of Web 2.0 self-management interventions for older adults (mean age > 50) with one or more chronic diseases	<p>Databases: ERIC, PsycINFO, PubMed, Academic Search Premier, CINAHL Plus, ASSIA: Applied Social Sciences Index and Abstracts (Jan 2004–Sept 2012)</p> <p>Search terms: chronic disease, chronic illness, heart disease, diabetes, arthritis, hypertension, COPD, self-care, self-management, outcome, internet, website</p>	14 studies (11 RCTs)	Sample sizes ranged from 18 participants to 855	<p>Participants reported greater self-efficacy for managing diseases and benefitted from communicating with healthcare providers and/or website moderators to receive feedback/social support.</p> <p>Asynchronous communication tools and progress tracking features (e.g. graphical displays of uploaded personal data) seen as being useful for self-management support. Web 2.0 engagement may be associated with improvements in health behaviours/health status.</p> <p>However, few studies indicated statistically significant improvements in medication adherence, biological outcomes, or healthcare utilisation.</p>	More research is needed to determine whether the long-term effectiveness of these programs is sustainable among larger, more diverse samples of chronically ill patients.

Citation	Aim/study question	Search strategy	No. of studies Included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
van Vugt et al. ⁴²	To identify which behaviour change techniques (BCTs) are being applied in online self-management programs for type 2 diabetes; indication of their effectiveness in relation to predefined health outcomes	Databases: PubMed, Embase, Cochrane, PsycINFO, CINAHL (1994 onwards) Search terms: diabetes mellitus; diabetes mellitus, type 2; Internet; eHealth; online; and web-based	13 RCTs reporting on 8 online self-management interventions	–	BCTs used were feedback on performance, providing information on consequences of behaviour, barrier identification/problem-solving, and self-monitoring of behaviour. These BCTs were also linked to positive outcomes for health behaviour change, psychological wellbeing, or clinical parameters.	Only a small number of theory-based online self-management support programs for type 2 diabetes use a select number of BCTs. Development of future online self-management interventions should be based on the use of theories and BCTs, and should be reported accurately.
Wantland et al. ⁴³	To provide info on patient/client knowledge and behavioural change outcomes after web-based interventions compared to outcomes after implementation of non-web-based interventions	Databases: MEDLINE, CINAHL, Cochrane Library, Embase, ERIC, PsycINFO (1996–2003) Search terms: computerized intervention, Internet intervention, Web-based therapy, Web-based intervention	22 studies (16 RCTs)	11,754 (5841 women; 5729 men)	Effect size comparisons showed improvement in outcomes for individuals using web-based interventions to achieve specified knowledge and/or behaviour change for the following studied variables: increased exercise time, knowledge of nutritional status, knowledge of asthma treatment, and participation in healthcare, slower health decline, improved body shape perception, and weight loss maintenance.	Effect outcomes revealed improved knowledge and/or improved behavioural outcomes for participants using the web-based interventions. Sites that incorporate the use of chat rooms demonstrated increased social support scores. Web-based interventions should be designed to allow individuals to tailor them to their specific needs.

Citation	Aim/study question	Search strategy	No. of studies Included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Wilson et al. ³⁶	To evaluate evidence relating to patient self-management and access to healthcare services for ethnic minority groups living with diabetes	Databases: MEDLINE, Cochrane, DARE, Health Technology Assessment and NHS EED, the British Nursing Index, CAB Abstracts, Embase, Global Health, Health Management Information Consortium, PsycINFO (1995–2009) <i>Diabetic Medicine and Ethnicity & Health</i> journals (1995–1999) Search terms illness specific (diabetes), including ethnicity (Caribbean, Pakistani, etc.), including themes, such as self-care, self-management, health care, etc.	18 qualitative; 18 quantitative studies (11 RCTs)	–	Self-management practices are in need of targeted intervention in terms of patients' knowledge and understanding of their illness; inadequacy of information, and language and communication difficulties arising from cultural differences.	Recommendations for practice and subsequent intervention primarily rest at the service level, but key barriers at patient and provider levels are also identified.

Table A8: Chronic disease interventions – study protocols

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
van Dijk-de Vries ⁴⁶	The Netherlands	Cluster RCT 4-month follow-up 12-month follow-up	460 patients (10 per practice nurse) diagnosed with type 2 diabetes and who could read and write Dutch will be recruited by their GPs via letters (with enclosed screening questionnaire and informed consent form)	<p>Patients will be randomly assigned to either the intervention group (SMS program) or the control group (usual care)</p> <p><i>Intervention:</i></p> <p>Face-to-face nurse-led intervention involving the following two components:</p> <ul style="list-style-type: none"> • Problem-solving: <ol style="list-style-type: none"> 1. Explain treatment and its rationale, and formulate a problem list 2. Clarify and define problem 3. Set achievable goals 4. Generate solutions 5. Choose preferred solution 6. Evaluation • Reattribution: <ol style="list-style-type: none"> 1. Define problem 2. Link thoughts to behaviour by keeping a diary 3. Action plan. 	<p>To evaluate the implementation and effects of the self-management support program (SMS) in routine care by addressing the following research questions:</p> <ol style="list-style-type: none"> 1. What is the uptake of the SMS program by the practice nurses and what barriers hamper the implementation of SMS in routine primary care? 2. What is the effectiveness of SMS in terms of daily functioning, emotional health status, social participation, self-management behaviour and healthcare use by patients with type 2 diabetes?

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
van Gaalen et al. ⁴⁵	The Netherlands	Cluster RCT (three arms) 6-month follow-up per patient and optional continuation 12-month follow-up per practice	420 patients who are aged 18–50 years, diagnosed with asthma, and have been prescribed inhaled corticosteroids, and/or montelukast for more than or equal to 3 months in the previous year, have internet access and are able to understand written and oral Dutch instructions will be recruited for the internet-based self-management (IBSM) program, with 140 patients per arm, by GPs from eligible general practices	<i>Intervention:</i> Internet-based self-management support program called PatientCoach, which consisted of a web-based and instruction visit for patients facilitated and delivered by GP or practice nurse. PatientCoach consisted of modules for: <ul style="list-style-type: none"> • Self-monitoring • A treatment plan • Motivational feedback • e-consultation • Personalised information (i.e. inhalation technique) • Reminders and forums for patients and professionals. 	To investigate and compare the effectiveness and cost-effectiveness of the following practice level randomised implementation strategies: <ul style="list-style-type: none"> • Minimum strategy: dissemination of the IBSM program • Intermediate strategy: minimum strategy and start-up support for professionals • Extended strategy: intermediate strategy and additional training and ongoing support for professionals. To assess: <ul style="list-style-type: none"> • Practices participate in IBSM • Asthma-related quality of life • Patients participate in IBSM • Cost-effectiveness of the strategies implemented.

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
van Bastelaar et al. ⁴⁴	The Netherlands	RCT 1-, 3-, 4- and 6-month follow-up	282 patients (143 for intervention group and 143 for control group) aged 18 years and older, diagnosed with type 1 or type 2 diabetes three or more months prior to study), have a depressed mood, diagnosed with depression (according to the Composite International Diagnostic Interview), have Internet access at home and have an email address will be recruited through advertising in clinics (i.e. hospitals, general practices, pharmacies, rehabilitation centres) and through various forms of media (i.e. patient journals, specialist journals, websites, emails, flyers, newspapers, etc.).	<i>Intervention:</i> Web-based CBT self-help course for 8 weeks, with feedback for home assignments from coaches. <i>Control:</i> Waiting list.	To investigate the effectiveness of web-based CBT in reducing levels of depressed mood and diabetes-specific emotional distress, and in increasing more self-management behaviours and glycaemic control among people living with diabetes (type 1 and type 2) and comorbid depression.

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Yu et al. (2012)	Canada	Observational cohort study 12 data points (every 3 weeks for 9 months) pre-implementation and post-implementation In-depth interviews on the impact of the web-based interviews	52 patients, aged > 25 years with HbA1c > 7.0%, systolic blood pressure >130 mmHg, LDL-C > 2.0 mmol/L or a BMI > 25 kg/m2 will be recruited from diabetes care centres 25 patients will be recruited by the study coordinator for the in-depth interviews	Web-based intervention consisting of the following features: <ul style="list-style-type: none"> • Search/browse function • Email notification • Education comic strip • Video-based peer storytelling • Online community • Goal setting • Things I do well • Blood glucose tracker • Blood pressure tracker • Food and activity tracker • Web diary • Email prompts • Stress management tools • Communication tools • Knowledgeable, credible source. 	To improve self-efficacy, quality of life, self-care, blood pressure, cholesterol and glycaemic control, and promote exercise in people living with Type 2 diabetes through a web-based self-management intervention.

Table A9: Back pain interventions – consumers

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Buhrman et al. (2004)	Sweden	RCT Level II	56 participants with chronic back pain, confirmed by medical history <i>Intervention</i> (n = 22) Mean age = 43.5 (SD = 10.3) Age range not reported 63.6% female <i>Control</i> (n = 29) Mean age = 45 (SD = 10.7) Age range not reported 62.1% female Recruited online and through national and regional newspaper articles	<i>Intervention:</i> 6-week internet-based cognitive behavioural self-help treatment Weekly follow-ups (participants sent in treatment information and had a structured, weekly phone call with a therapist providing feedback), which consisted of: <ul style="list-style-type: none"> • Psychological components (e.g. dealing with unhelpful thoughts and beliefs, changing focus) in addition to stretching and physical exercises • Teaching coping strategies • A CD with instructions for applied relaxation. <i>Control:</i> Waiting list.	Significant differences between conditions for improvement in coping strategies and significant clinical change in catastrophising, but not for pain or impairment or depression indicators. At 3 months follow-up, there was significant reduction in all outcomes once all participants in both groups had received the intervention. <i>Attrition:</i> Overall 9%.	While the internet-based intervention appeared to bring some benefit to participants, strong evidence was not provided for the difference between the intervention group and the control group with regards to the outcomes measured. <i>Limitations:</i> <ul style="list-style-type: none"> • Sample may not be representative of clinical sample; participants may already be motivated to change their behaviour • Online recruitment limits generalisability of findings. Self-reported online questionnaires.

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Carpenter et al. (2012)	US	RCT Level II	141 participants with chronic low back pain; Intervention (n = 70) and control (n = 71) Demographics not provided separately for intervention and control <i>Overall</i> Mean age = 42.5 (SD = 10) Age range = 21–74 83% female Recruited via internet bulletin boards	<i>Intervention:</i> Online CBT intervention, with six chapters (1-1.5 hours to complete) for chronic lower back pain consisting of: <ul style="list-style-type: none"> • Pain education • CBT techniques, which included cognitive restructuring; stress management; relaxation training, and mindfulness. <i>Control:</i> Waiting list.	Significant differences between conditions for: <ul style="list-style-type: none"> • Pain attitudes • Fear avoidance beliefs • Pain catastrophising; pain-related physical disability and pain self-efficacy. No significant difference for: <ul style="list-style-type: none"> • Work-related fear avoidance beliefs • Pain severity or belief in a medical cure for pain. <i>Attrition:</i> <ul style="list-style-type: none"> • Intervention = 10% • Control = 22.5%. 81% of participants completed all six chapters.	Cognitive and physical outcomes improved for those who received the online CBT intervention. The reasonably high completion rate appears to suggest the intervention was acceptable to participants. <i>Limitations:</i> <ul style="list-style-type: none"> • Predominantly female sample, may not be generalisable to males • Method of recruitment limits generalisability to broader population • Dropout differed by gender, and reasons for dropout not investigated • Self-reported measures.

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Chiauzzi et al. (2010)	US	RCT Level II	<p>209 participants with chronic back pain</p> <p><i>Intervention</i> (n = 104) Mean age = 47.3 (SD = 12.2) Age range not reported 67% female</p> <p><i>Control</i> (n = 105) Mean age = 45.0 (SD = 11.7) Age range not reported 70% female</p> <p>Recruited online through professional and patient contacts and through staff recruiting at a medical school</p>	<p><i>Intervention:</i></p> <p>Online CBT-based self-management program for people with chronic pain.</p> <p>Tailored website components included:</p> <ul style="list-style-type: none"> • Collaborative decision-making with health professionals • CBT for self-efficacy • Thought and mood management • Motivational enhancement through tailored feedback • Stress management • Exercise practices. <p><i>Control:</i></p> <p>Written guide covering causes of back pain, treatment and prevention, and practical tips by email.</p>	<p>At 3 months and 6 months follow-up:</p> <ul style="list-style-type: none"> • Significant group differences between conditions in the levels of stress measured • No significant differences between conditions for measures of depression, anxiety or fear avoidance behaviours • No significant differences in physical functioning, self-efficacy or pain. <p>While differences between groups were not statistically significant, more participants had a clinically significant improvement in depression, anxiety and stress within the intervention group than the control group.</p> <p><i>Attrition</i> at 6 months follow-up:</p> <ul style="list-style-type: none"> • Intervention = 36% • Control = 16%. 	<p>Limited evidence that the online CBT self-management program provided benefit to participants' condition compared to information-only control.</p> <p>Some evidence to suggest the CBT self-management intervention might provide clinically significant on psychological changes indices to some participants.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • High attrition in the intervention group • Influence of staff contact to remind group to complete protocols not measured in the study.

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Coudeyre et al. (2007)	France	Quasi RCT Level III-1	2337 participants with acute lower back pain <i>Intervention</i> (n = 1334) Mean age = 45 (SD = 12) Age range not reported 44% female <i>Control</i> (n = 1408) Mean age = 44 (SD = 12) Age range not reported 42% female Recruitment: 60 GPs per geographical region in France (n = 30) were selected at random to participate. Each GP had to enrol up to four consecutive patients with acute lower back pain	Randomisation was at the level of the participating GPs. <i>Intervention:</i> Usual care from GP plus French translation of the 'back book', a guide to help healthcare providers inform and educate patients. <i>Control:</i> Usual care from GP.	Patients in the intervention group: <ul style="list-style-type: none"> • Lower reporting of persistent back pain (10.5% vs 14.1%; p = 0.01) • More satisfied with the information they received about physical activities; when to consult their physician; and how to prevent a new episode of lower back pain. <p>No significant differences between groups in number of patients who had taken sick leave or mean sick leave duration.</p> <p><i>Attrition</i> at follow-up:</p> <ul style="list-style-type: none"> • Intervention = 15.6% • Control = 14.6%. 	Adding the provision of an information book to usual GP care improved patient satisfaction and resulted in some clinical benefits. Although the overall effect was not large, the cost and complexity of the intervention was minimal. <i>Limitations:</i> <ul style="list-style-type: none"> • Randomisation at level of GP rather than patient did not cluster randomise GPs • Self-reported questionnaires.

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Dekker et al. (2012)	The Netherlands	Prognostic cohort study Level III-3	16 patients with non-specific chronic lower back pain Mean age = 54 (SD = 11) Age range not reported 56.3% female Recruited from a rehabilitation centre	Patients wore a movement sensor and a personal digital assistant (PDA) for a maximum of 14 hrs each day to measure daily activities for two weeks. The PDA provided feedback consisting of: (1) Visual real-time feedback (2) Hourly time-related personalised feedback (based on difference between the activity pattern of the patient at that moment and the reference value) which enabled them to adjust their activities in an adequate way.	At the group level, activity: <ul style="list-style-type: none"> Decreased significantly after discouraging feedback during both feedback weeks Increased significantly after encouraging feedback. At the individual level: <ul style="list-style-type: none"> 12 patients (75%) had a positive response to the feedback messages Four (25%) had a response in another direction Variability in the magnitude of the response between patients. Weak yet statistically significant negative correlation between the response and pain intensity levels (i.e. response to feedback better when pain intensity levels lower). <i>Attrition:</i> Not reported.	Some evidence of improvement in patients' activity levels demonstrated. Further research may be warranted. <i>Limitations:</i> <ul style="list-style-type: none"> Small sample size Lack of control group.

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Godges et al. (2008)	US	Quasi RCT Level III-1	<p>34 people with lower back pain resulting from a work-related injury</p> <p><i>Education group</i> (n = 16) Mean age = 35.8 (SD = 9.0) Age range not reported 18.7% female</p> <p><i>Control group</i> (n = 18) Mean age = 32.7 (SD = 9.1) Age range not reported 11.1% female</p> <p>Recruitment: Consecutive patients who had been referred by occupational therapy to receive a physical therapy intervention and who met the inclusion criteria were invited to participate in the study.</p>	<p><i>Intervention:</i></p> <ul style="list-style-type: none"> • Usual care = physical examination to determine their physical therapy interventions comprised of physical; and an educational pamphlet describing commonly used therapeutic exercises and ergonomic principles • Educational booklet covering role of inactivity and stress in back pain, understanding and controlling pain, role of relaxation and exercise in pain control. <p><i>Control:</i> Usual care.</p>	<p>Significantly lower number of days to return to work in the intervention group [as determined by the participants' occupational health physician]</p> <p>[In the context of no significant differences between the groups at baseline according to gender, age, pain or beliefs related to avoiding physical activity and work.]</p> <p>Change in these variables at follow-up was not assessed.</p> <p><i>Attrition:</i> Not reported.</p>	<p>The addition of an educational booklet to a physical activity-based intervention reduced an objective assessment of the number of days taken to return to work.</p> <p>Results appear worthy of further exploration in a larger study that incorporates an examination of potential mediators.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • Small sample size and thus there is limited generalisability • No follow-up data.

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Goffar (2005)	US	RCT Level II	<p>150 military patients with back pain</p> <p><i>Intervention 1</i> (n = 50) Mean age = 30.4 (SD N/S) Age range not reported 34% female</p> <p><i>Intervention 2</i> (n = 50) Mean age = 28.8 (SD N/S) Age range not reported 36% female</p> <p><i>Intervention 3</i> (n = 50) Mean age = 31.66 (SD N/S) Age range not reported 32% female</p> <p>Recruited from a health clinic in an army base; participants invited to enrol during their initial visit to the health clinic for treatment of back pain</p>	<p>Pamphlet intervention (1): Pamphlet providing text-based information including recommendations for activity modification, ergonomic reminders, advice on coping with back pain and exercise prescription.</p> <p>Group health education intervention (2): A one-hour lecture with professionally prepared 20-minute video, and brief exercise session supplemented by a brochure.</p> <p>Multimedia instructional module intervention (3): Tailored, interactive multimedia educational intervention incorporating text, animation, line art, still photography, live action video and narration.</p>	<p>Multimedia instructional module intervention demonstrated statistically and clinically significant improvements in disability over 26 weeks compared to the other two intervention groups.</p> <p>No statistically significant differences between the three intervention groups for pain.</p> <p>None of the groups achieved clinically significant change in fear avoidance (although some suggestion of slightly greater improvement in multimedia instructional module group).</p> <p><i>Attrition at 26-week follow-up:</i></p> <ul style="list-style-type: none"> • Intervention 1 = 70% • Intervention 2 = 84% • Intervention 3 = 52%. 	<p>There was some evidence that a tailored interactive multimedia intervention can provide benefits to those with back pain in terms of reduced disability.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • Only one-third of participants provided follow-up data • High percentage of male participants.

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Gremeaux et al. (2013)	France	Quasi RCT Level III-1 Participants visiting the spa in alternate months were allocated to the intervention group and control group to avoid contamination	266 lower-back pain patients <i>Intervention</i> (n=188) Mean age = 59.7 (SD = 6.8) Age range not reported 81.8% female <i>Control</i> (n = 172) Mean age = 55.3 (SD = 9) Age range not reported 74.1% female Recruitment: Participants who were prescribed a visit to a thermal spa by their GP, rheumatologist, or physical medicine and rehabilitation specialist were invited to participate.	<i>Intervention:</i> Three education workshops, one per week for each of the 3 weeks of therapy, each lasting 1.5 hours. <ul style="list-style-type: none">'Learn to manage your back pain''Getting back into shape and keeping fit''Your back in everyday life'. <i>Control:</i> Non-standardised verbal information in accordance with the usual practices of the spa.	Intervention group showed a greater improvement in fear avoidance beliefs (at a clinically significant level). No significant differences between groups in disability or pain intensity. Satisfaction with the information received was significantly greater in the intervention group. <i>Attrition</i> at 6 months follow-up: <ul style="list-style-type: none">Intervention = 18%Control = 35%.	Although the intervention had a clinically significant impact on participants' fear avoidance beliefs, this did not translate into clinical improvement either in disability or pain intensity. <i>Limitations:</i> <ul style="list-style-type: none">Age difference between groupsHigh attrition in the control groupSelf-report.
Lamb et al. (2010)	UK	RCT Level II	701 participants with lower back pain <i>Intervention</i> (n = 468) Mean age = 53 (SD = 15, range 19-85) 59% female	<i>Intervention:</i> <ul style="list-style-type: none">CBT intervention delivered by physiotherapists, nurses, psychologists and occupational therapistsDesigned to target unhelpful beliefs about pain and activity, and promote engagement in	Both groups showed improvements over baseline. Compared to comparison group, CBT group demonstrated at least twice as much improvement for the primary outcomes (disability and lower back pain).	This study provides strong evidence of the sustained benefits of CBT as a treatment for lower back pain compared to more conventional and less intensive approaches. <i>Limitations:</i>

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			<p>Control (n = 233)</p> <p>Mean age = 54</p> <p>(SD = 15, range 19–85)</p> <p>61% female</p> <p>Recruitment: Participants were identified by searching electronic GP records, and from direct referrals from GPs.</p>	<p>leisure, physical and occupational activity</p> <ul style="list-style-type: none"> Participant attended an individualised assessment that included goal setting. Thereafter, intervention delivered in groups of about eight people. <p><i>Comparison:</i></p> <ul style="list-style-type: none"> Primary care nurses attended a 1-hour training session on the management of lower back pain, focusing on best practice recommendations to promote physical activity and analgesia, and to encourage a positive outlook. <p>Nurses met with each trial participant for an individual advisory session promoting this approach and provided a self-help book.</p>	<p>These improvements were sustained or increased over time at 3, 6 and 12 months follow-up.</p> <p>At 12 months, 60% of the CBT condition reported some or complete recovery compared to 31% of the other condition.</p> <p><i>Attrition</i> at 12 months follow-up:</p> <ul style="list-style-type: none"> Intervention = 30% Control = 27%. 	<ul style="list-style-type: none"> Self-reported questionnaires – ceiling effect, whereby independent variable no longer has an effect on the dependent variable Difficult to determine clinical significance High attrition rates in both intervention and control conditions.

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Linton & Nordin (2006)	Sweden	RCT Level II	<p>202 participants with spinal pain who had participated in a RCT five years earlier</p> <p>Mean age = 49 years (SD N/S)</p> <p>Age range not reported</p> <p>70% female</p> <p>Age and gender demographics not reported by intervention groups</p> <p>Recruitment:</p> <p>In the original study, participants were recruited from local primary care facilities and via an advertisement in a local newspaper.</p>	<p>Participants were randomised to:</p> <p>1. CBT group:</p> <p>6 session (2 hours) program incorporating problem-solving, risk analysis, activity scheduling and other coping skills.</p> <p>Information group 1: Standardised written pamphlet emphasising self-help and the need to remain active.</p> <p>Information group 2:</p> <p>Ergonomic and 'back school' based information in six instalments.</p>	<p>Relative to both information comparison groups, CBT group reported significantly less pain, less pain medication use, better physical function, lower anxiety and depression and better health; but no differences in total number of self-reported healthcare visits during the previous year.</p> <p>Using objectively verified information at 5-year follow-up:</p> <ul style="list-style-type: none"> • Participants in information group reported more sick leave for back pain • Risk of being on long-term leave for back pain was 2.61 times lower for the CBT group; and risk of being on long-term leave for any illness was 3 times lower for the CBT group. <p><i>Attrition:</i></p> <p>From 12 months follow-up of previous related study to 5-year follow up of the current study:</p> <ul style="list-style-type: none"> • CBT group = 6% • Information group 1 = 6.5% • Information group 2 = 3.5%. 	<p>CBT compared to information alone led to an objectively verified decrease in sick leave for back pain or being on long-term sick leave five years post-intervention.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • Self-report data (but objectively verified) • High percentage of female participants.

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Monticone et al. (2013)	Italy	RCT Level II	<p>90 outpatients with low back pain</p> <p><i>Intervention</i> (n = 45)</p> <p>Mean age = 49.0 (SD = 8.0)</p> <p>Age range not reported</p> <p>60% female</p> <p><i>Control</i> (n = 45)</p> <p>Mean age = 49.7 (SD = 7.0)</p> <p>Age range not reported</p> <p>55% female</p> <p>Recruitment: Outpatients with low back pain who were referred to the research hospital were consecutively invited to participate in the study.</p>	<p>Participants were randomised to either the experimental CBT-based multidisciplinary condition or control exercise training condition.</p> <p><i>Intervention:</i></p> <p>Participants in the CBT group attended 60-minute sessions individually once a week for 5 weeks, after which the psychologist met the patients for further 1-hour sessions once a month for a year. The purpose of the CBT was to modify fear of movement beliefs, catastrophising thinking and negative feelings.</p> <p><i>Control:</i></p> <p>Participants in the exercise training group underwent a multimodal motor program consisting of active and passive mobilisations of the spine, and exercises aimed at stretching and strengthening muscles and improving posture.</p>	<p>Disability significantly decreased between T1 and T4 (3 years) in the CBT group but changed minimally in the exercise group.</p> <p>Fear avoidance behaviours, pain and quality of life significantly improved between T1 and T3 (12 months) in the experimental group, but changed minimally in the control group.</p> <p>Patients' perception of the efficacy of treatment was significantly higher in the experimental group.</p> <p><i>Attrition:</i></p> <p>Nil. All participants were assessed in both intervention and control group at 12 months follow-up.</p>	<p>Although the sample size was small, this study provides reasonable evidence that CBT provided clinically significant improvements that were sustained over 3 years compared with exercise.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • Small sample size • Self-report data • Components other than fear avoidance beliefs not addressed in CBT meetings.

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Odeen et al. (2013)	Norway	Cluster RCT Level II Employment units randomised into one of three conditions	1746 public sector employees Demographic data only provided for two municipalities from which the units were selected Kongsberg Mean age = 44.46 (SD = 11.4) Age range not reported 82.1% female Horten Mean age = 43.8 (SD = 11.5) Age range nor reported 81% female Recruited from 135 'units' of employees in two Norwegian municipalities; all employees invited to participate	<i>Intervention 1:</i> Education and peer support (EPS) • Two educational meetings, about 2–3 months apart to educate about lower back pain. <i>Intervention 2:</i> Education and peer support with access to an outpatient clinic (EPSOC) • EPS + access to peer adviser who could refer the employee directly to the clinic. <i>Control group:</i> • No intervention.	<i>EPS group:</i> • 4% reduction in sick leave. <i>EPSOC group:</i> • Reduction of 7% in sick leave (significant reduction compared with the control group; p = 0.04). <i>Control group:</i> • Sick leave increased by 7%. Significant decrease in number of employees reporting lower back pain during intervention year for EPSOC (from 58% to 49%; p = 0.015), while an increase in lower back pain reporting was observed in the control group (from 54% to 58%). No significant differences in reported musculoskeletal complaints (84%-89%). <i>Attrition:</i> • EPS = 2.3% • EPSOC = 2.0% • Control = 0%.	Findings provide good evidence that programs comprising education and peer support are effective at decreasing rates of sick leave at a rate similar to the same intervention plus access to medical care, but the latter had additional benefit of decreasing the number of employees reporting lower back pain . <i>Limitations:</i> • Turnover of employees • Confounders not controlled for • Cluster randomisation can lead to confounding effects on outcomes.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Riva et al. (2014)	Switzerland	RCT Level II	<p>51 participants with chronic back pain</p> <p><i>Intervention</i> (n = 27)</p> <p>Mean age = 44 (SD = 13.6)</p> <p>Age range not reported</p> <p>51.9% female</p> <p><i>Control</i> (n = 24)</p> <p>Mean age = 51 (SD = 14.1)</p> <p>Age range not reported</p> <p>50% female</p> <p>Recruitment: Participants were screened at clinics and rehabilitation centres and invited to participate.</p>	<p>All participants used an internet-based self-management intervention on patient empowerment.</p> <p>Non-interactive features of the website available to all participants included a library, information on first aid and FAQs.</p> <p><i>Intervention:</i></p> <p>Participants received access to interactive features, including a virtual gym, action plan, testimonials and commentaries, and a quiz.</p> <p><i>Control:</i></p> <p>Participants did not have access to the interactive sections of the website.</p>	<p>Mean levels of overall patient empowerment increased significantly in the intervention group with access to the interactive features of the website compared to the control group.</p> <p>Physical exercise did not improve in either group; or perceived pain burden significantly decreased in both conditions.</p> <p>Participants in the intervention group, on average, used the website more often and considered it more effective for improving chronic back pain than participants in the control group.</p> <p><i>Attrition:</i></p> <p>Nil – that is, all participants in intervention group and control group were assessed at final (8 weeks) follow-up.</p>	<p>Adding interactive features to a self-management website appeared engaging to participants, but had no significant impact on behaviours or clinical outcomes.</p> <p>Some evidence that the website, either with or without interactive elements, might benefit participants' levels of pain – suggesting further research may be warranted.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • Lack of pure control group • Control group older than intervention group • Short follow-up • Lack of specificity in reporting means effectiveness according to the features implemented cannot be identified.

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Schulz et al. (2010)	Switzerland	Uncontrolled before and after study Level III-3	371 participants with low back pain No demographic details provided Recruitment: Participants recruited in a number of ways, including by health professionals, by friends and relatives, by radio, TV and the internet.	<i>Intervention:</i> Participants asked to regularly visit a website developed for low back pain sufferers based on the concept of health literacy. Website material included: <ul style="list-style-type: none">• Simple written information on low back pain, the importance of posture and physical activity• Audio lessons delivered by rheumatologists, procedural information and videos, e.g. on how to perform exercises. Functions for participants to interact with each other and with health professionals.	At follow-up: <ul style="list-style-type: none">• 15% reported that they were using painkillers less often• 83% reported that the website had increased their knowledge of back pain, and 69% that it had contributed to managing pain. Other frequently acknowledged benefits were improved communication with doctors, family and colleagues; and one-third reported that they exercised more often. No evidence of a dose-response effect. <i>Attrition:</i> Post-intervention evaluations were received from only 35% of participants.	There was some evidence to suggest that the intervention was well-received by participants. However, no conclusions can be drawn about its effectiveness in terms of clinical outcomes or its generalisability. <i>Limitations:</i> <ul style="list-style-type: none">• Lack of control group or randomisation to condition• Absence of statistical testing• Lack of demographic information• Sole focus on self-report.

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Schweier et al. (2014)	Germany	Controlled trial Level III-1	699 participants with either chronic back pain or coronary heart disease <i>Intervention</i> (n = 343) Mean age = 53.8 (SD = 9.2) Age range not reported 62.5% female <i>Control</i> (n = 356) Mean age = 52.7 (SD = 8.1) Age range not reported 51.1% female Mean age = 53.2 (SD = 8.6) 51.1% female Recruited from inpatient rehabilitation centres	<i>Intervention:</i> Participants attended a 1-hour presentation about a website comprised of web-based patient narratives on successful lifestyle changes. Based on the concept of behaviour change via peer modelling, website provided more than 1000 video, audio and text clips from interviews with patients living with coronary heart disease and chronic back pain addressing different aspects of lifestyle modification. <i>Control:</i> No intervention.	There were no significant differences in changes in physical activity or eating behaviour between the two conditions. In per-protocol analyses, website use was associated with larger increases in physical activity, but not with higher mean differences in healthy eating. <i>Attrition:</i> <ul style="list-style-type: none"> • Intervention = 23.2% • Control = 11.1%. 	Provides limited evidence to support web-based intervention. No overall differences between conditions, but some evidence to suggest that adherence to the intervention produced better outcomes. <i>Limitations:</i> High dropout in the intervention group, raising questions about acceptability.

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Slater et al. (2012)	Australia	Uncontrolled before and after study Level III-3	51 participants with lower back pain Mean age = 62.3 (SD = 15.1, range = 27-86) 33% female Recruitment: Participants invited to participate through flyers distributed by a medical service and an advocacy organisation.	<i>Intervention:</i> Evidence-based, interdisciplinary pain education program, 6.5 hours of a single day. Key modules included: <ul style="list-style-type: none">• Introducing pain constructs• Functional motor behaviours• Medical options• Use of coping skills• Problem-based approaches. Alternative ways people can respond to pain.	Immediately post-intervention: <ul style="list-style-type: none">• Significant, clinically important improvement in positive beliefs about back pain; however, changes not sustained at 3 months follow-up. Number of self-management strategies used, pain-related cognitive behavioural measures, healthcare utilisation and pain intensity measures did not change significantly from baseline to 3 months follow-up. The majority of consumers rated the program as useful. <i>Attrition:</i> 51% (i.e., 49% response rate on 3 month post-intervention evaluation)	Although the program was well received by participants and seemed to boost knowledge when assessed immediately after the intervention, there was no evidence that the program was of sustainable benefit to participants or worthy of further investigation. <i>Limitations:</i> <ul style="list-style-type: none">• Self-report data• Small sample size• Low response rate.

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Slater et al. (2013)	Australia	Cluster RCT Level II Pharmacies randomised to one of three conditions: pamphlet + education; pamphlet only; or usual care (control)	317 pharmacy consumers with lower back pain <i>Pamphlet + education</i> (n = 102) Mean age = 43.3 (SD =13.2, range = 18–65) 55.9% female <i>Pamphlet only</i> (n = 111) Mean age = 44.2 (SD =12.7, range = 19–65) 64.9% female <i>Control</i> (n = 104) Mean age = 44.3 (SD =11.8, range = 20–64) 63% female Consumers who approached pharmacist with a prescription for analgesia related to lower back pain, requested non-prescription medication for lower back pain, or inquired about the study after seeing study posters were invited to participate.	<i>Intervention 1:</i> Pamphlet + verbal reinforcement of content and biopsychosocial model of care from trained pharmacy staff member. <i>Intervention 2:</i> Pamphlets containing evidence-based information about management of lower back pain, highlighting key messages related to the need to remain active, positive and engaged at work and in social situations. <i>Control:</i> Usual care for lower back pain.	After adjusting for baseline scores: <ul style="list-style-type: none"> No significant differences between groups in back beliefs, physical activity related fear, pain severity, and activity impairment at 2 or 8 weeks follow-up Work-related fear was significantly lower in those consumers receiving pamphlet (with or without education), but effect size was small. <i>Attrition:</i> At 8 weeks follow-up: <ul style="list-style-type: none"> Intervention 1 = 42.2 Intervention 2 = 51.4% Control = 43.3%. Non-responders were younger.	The study suggests that verbal reinforcement of key messages by trained pharmacists provides no additional benefit to written information alone. The benefits of written information compared to control appear minimal. <i>Limitations:</i> <ul style="list-style-type: none"> High attrition rates across intervention groups and control group Self-report data Selection bias due to pharmacy clusters Highly motivated patients participated Short follow-up period.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Sorensen et al. (2012)	Denmark	RCT Level II	207 chronic lower back pain patients <i>Education group</i> (n = 105) Mean age = 40 (SD N/S, range = 33–48) 50% female <i>Physical training group</i> (n = 102) Mean age = 38 (SD N/S, range = 32–47) 55% female Recruited from a non-surgical back clinic	<i>Educational group:</i> <ul style="list-style-type: none"> One to three 30–60 minute individual and group-based sessions, at one to three week intervals Received a CD with a PowerPoint presentation for studying at home on general biological and cognitive aspects of back pain. <i>Physical training group:</i> <ul style="list-style-type: none"> Treated with exercises along with advice on posture with an emphasis on gradual progression, with the aim of eventually recovering full function. Some were additionally assigned to an intensive exercise program.	Significant between-group differences (greater improvement in educational group only) for: <ul style="list-style-type: none"> Fear avoidance beliefs (short- and long-term) Other beliefs about the back at six months follow-up, but not 12 months. No significant between-group differences for the primary measure of pain or for activity limitation, physical activity, work ability, quality of life, sick leave, medication use, healthcare contacts. Pain was reduced significantly over 12 months follow-up in both groups ($p < 0.001$). <i>Attrition:</i> At 12 months follow-up: <ul style="list-style-type: none"> Education group = 18% Physical training group = 24%. 	Findings provide evidence to suggest some beneficial impact on fear avoidance beliefs as result of an educational program. Educational and physical activity interventions appeared equally beneficial in reducing lower back pain. <i>Limitations:</i> <ul style="list-style-type: none"> Self-report data Highly motivated participants.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Taloyan et al. 2013	Sweden	Uncontrolled before and after study Level III–3	209 patients with back pain Mean age NS 45% aged 19–37 years 55% aged 38–45 years 59.3% female Recruited from a rehabilitation program for people on continuous sick leave from work for six weeks or more at one primary healthcare centre. Participants included consecutively upon presentation at the program.	<i>Intervention:</i> 4-week CBT-based program that aimed to reduce patients' pain-related worry through a focus on pain worry, distribution and frequency. Also offered all-round physical exercises.	Pain-related worry and prevalence of depression reduced significantly following the program. Less evidence that the program impacted significantly on participants' ratings of actual pain. <i>Attrition:</i> 14%.	Although pain-related worry and depression did improve from pre- to post, this study found no evidence that CBT focused on pain-related worry benefitted reported levels of pain. <i>Limitations:</i> <ul style="list-style-type: none"> • Self-report data. Lack of an equal number of participants with more severe depression.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Thomas (2010)	US	RCT Level II	82 patients with acute lumbar back strain <i>Intervention</i> (n = 40) <i>Control</i> (n = 42) Overall Mean age = 42 (SD = 11.7) 53% female Demographics not stated by group Recruitment: Patients recruited from four medical centres. Doctors invited patients to participate from those walking in to the clinic who met inclusion criteria.	<i>Intervention:</i> Viewed a 12-minute video addressing psychosocial risk factors on a portable DVD player brought to the examination room. The DVD covered a broad range of topics, including: <ul style="list-style-type: none"> • Definition and physiology of a lumbar strain • Symptomatology • Medical treatment recommendations. Expected time course of recovery.	Intervention group had significantly higher knowledge and improved beliefs and attitudes about pain post-intervention compared to control group. No differences between groups on any of the primary outcomes, including perceived degree of disability, psychological distress, functioning, pain, or coping with pain. <i>Attrition</i> at 3 months follow-up: <ul style="list-style-type: none"> • Intervention = 43% • Control = 35%. 	Although the intervention was extremely straightforward and inexpensive to implement, and beneficial in terms of improving patients' knowledge and attitudes, this improvement did not translate into any clinical benefit. <i>Limitations:</i> <ul style="list-style-type: none"> • High attrition in intervention group • Self-report data • Small sample size.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Udermann et al. (2004)	US	Uncontrolled before and after study Level III-3	62 participants with lower back pain Mean age = 42.4 (SD N/S, range = 20-70) 56% female Recruited through online and newspaper advertisements	The educational booklet encourages participants to explore the links between certain spine positions and resulting patterns of pain response. The premise of the booklet is that through exploring these patterns, participants receive immediate feedback concerning the benefit or detriment of each activity. Strategic use of the exercise becomes the foundation of the readers' self-treatment program.	Participants' average pain magnitude decreased significantly from 1 week to 9 months follow-up, and this decrease was maintained at 18 months follow-up. Pain reduction and the number of pain episodes improved similarly, with further improvement between 9 and 18 months follow-up. At 18 months follow-up, 90% of participants reported that they had tried the exercises. <i>Attrition: 23%.</i>	This study provides some evidence that an educational, self-management booklet could be effective at treating lower back pain. More rigorous (e.g. controlled) studies may be warranted. <i>Limitations:</i> <ul style="list-style-type: none"> • Cannot generalise to patients who experience more severe pain, i.e. scores higher than 1.3 (out of 3) pain intensity • Motivated volunteer participants.

Table A10: Back pain interventions – health professionals

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Domenech et al. (2011)	Spain	RCT Level II	170 physical therapy students <i>Intervention</i> (n = 88) Mean age = 21.5 (SD = 3.5) 61% female <i>Control</i> (n = 82) Mean age = 22.3 (SD = 5.3) 52% female Recruitment: Not specified.	<i>Intervention:</i> Participants received an education module based on the biopsychosocial model of back pain management. The module consisted of two sessions of three hours each, one week apart and explained the causes of low back pain and the recommendations of clinical practice guidelines. The learning methodology involved the discussion of clinical cases with the assistance of patients, in which discussions the students were invited to actively participate. <i>Control:</i> Participants received lectures on the biomechanics of the spine.	At post-test, there was a significant reduction in all subscales of the Fear Avoidance Belief Questionnaire in the experimental group compared to the control group. In clinical vignettes, participants in the intervention group also gave patients recommendations that more closely followed guidelines. <i>Attrition:</i> Not reported.	The study provides some evidence that physical therapy students can be taught to adhere to clinical guidelines when treating patients using focused teaching. <i>Limitations:</i> <ul style="list-style-type: none"> • The use of vignettes as a proxy for practitioner behaviour • Questionable appropriateness of fear avoidance beliefs as a training outcome for health professionals.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Leonhardt et al. (2008)	Germany	3-armed RCT Level II	<p>126 GPs in two German regions (of 883 who were invited to participate)</p> <p>GPs recruited 1378 consecutive patients with low back pain</p> <p><i>Intervention 1</i> (n = 479)</p> <p>Mean age = 49.1 (SD = 13.3, range = 21–83)</p> <p>59% female</p> <p><i>Intervention 2</i> (n = 489)</p> <p>Mean age = 47.3 (SD = 13.5, range = 20–91)</p> <p>61% female</p> <p><i>Control</i> (n = 410)</p> <p>Mean age = 50.2 (SD = 14.3, range = 20–81)</p> <p>53% female</p> <p>GP practices randomised into one of three conditions: two experimental (intervention) conditions (A & B) and one control condition (C).</p>	<p><i>Intervention A:</i></p> <p>GPs trained in three interactive 2-hour quality circles and provided with extensive information material to implement lower back pain care guidelines.</p> <p><i>Intervention B:</i></p> <p>Practice nurses trained to deliver counselling based on the transtheoretical model (TMM), i.e. to identify the stages of change and to use stage-specific counselling strategies. Practice nurses then invited all identified patients for up to three 15–20 minute counselling sessions. Patients also received specially designed, stage-specific booklets.</p> <p><i>Control:</i></p> <p>GPs received the lower back pain guideline via mail.</p>	<p>At 6 months:</p> <ul style="list-style-type: none"> In both intervention groups, patients' physical activity increased from baseline Control group showed reduced total physical activity No difference between groups in self-efficacy. <p>At 12 months:</p> <ul style="list-style-type: none"> All three groups showed increased physical activity levels <p><i>Attrition at 12 months:</i></p> <p>Intervention A = 11%</p> <p>Intervention B = 14%</p> <p>Control = 11% dropped out.</p>	<p>Although both interventions appeared to increase levels of physical activity in the short-term, this effect was not maintained at 12 months; and no impact on hypothesised mediator (self-efficacy).</p> <p>No evidence suggesting that these interventions targeting healthcare practitioners brought meaningful benefit to patients with low back pain.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> Relied on self-reported data Highly motivated patients agreed to participate, which may have influenced outcomes in control condition Blinding not feasible in education-based intervention.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
Overmeer et al. (2011)	Sweden	RCT Level II	<p>42 licensed physical therapists who applied for an 8-day university training course were invited to participate</p> <p>Mean age = 45.8 (SD = 6.8), 66% female</p> <p>In turn, the physical therapists recruited 274 patients with acute and subacute musculoskeletal pain</p> <p><i>Intervention</i> (n = 142) Mean age = 47 (SD = 12.9) 74% female</p> <p><i>Control</i> (n = 132) Mean age = 44 (SD = 13.2) 72% female</p>	<p>Physical therapists were randomised to the experimental course (intervention) or a waiting list control.</p> <p>8-day course spread over 8 weeks. Course was aimed at identifying and addressing psychosocial prognostic factors within physical therapy treatment. It focused on theory, role-playing to practise new skills and feedback on practised skills.</p> <p>Between teaching sessions, participants could practise newly acquired skills as homework assignments with patients whom they were treating.</p> <p><i>Control:</i> Waiting list.</p>	<p>All patients in both groups showed reductions in pain intensity and disability, but there were no significant differences by condition.</p> <p>There was no evidence to suggest that patients in specific risk groups (e.g. high anxiety or catastrophic thoughts) received any additional benefit from being treated by physical therapists who attended the course.</p> <p><i>Attrition</i> at 6 months follow-up:</p> <ul style="list-style-type: none"> • Intervention = 19.3% • Control = 14.4%. 	<p>There was no evidence that additional training for physical therapists provided any benefits for patients with musculoskeletal pain.</p> <p><i>Limitations:</i></p> <ul style="list-style-type: none"> • No measure of practice behaviours of physical therapists, and thus cannot make conclusive attributions to course content • Self-report data.

Citation	Country	Study design & level of evidence	Study population & recruitment	Intervention design	Key findings	Recommendations/implications
van Dulmen et al (2014)	The Netherlands	Cluster RCT Level II	90 physical therapists <i>Peer assessment group</i> (n = 49) Mean age = 40.4 (SD = 12.4) 61.4% female <i>Control</i> (n = 41) Mean age = 45.8 (SD = 9.9) 47.0% female Recruitment: Members within the professional body of physical therapists in the Netherlands received an electronic newsletter with an invitation to participate.	Both groups participated in 4 educational sessions and used clinical patient cases. <i>Intervention:</i> In the peer assessment group, clinical performance was directly observed and evaluated by peers in a simulated setting and was aimed at improving guideline consistent knowledge, clinical reasoning skills and performance. <i>Control:</i> The case-based discussion group used structured discussions aimed at improving guideline consistent knowledge and reasoning skills. For each meeting, assignments were given to guide and evaluate the case discussion process.	Primary outcome measures were knowledge of the lower back pain guideline and guideline consistent reasoning, measured using 4 clinical vignettes. Improvement scores on vignettes at 6 months post-intervention were significantly higher in the peer assessment group. <i>Attrition</i> at 6 months follow-up: <ul style="list-style-type: none"> Intervention = 10% Control = 17%. 	The study used a rigorous design and demonstrated the benefits of peer assessment over group discussion as a means to enhance adherence to guidelines. <i>Limitations:</i> <ul style="list-style-type: none"> Use of vignettes as proxy does not demonstrate behaviour in clinical care setting Small sample size Selection bias – voluntary participation Organisational and contextual barriers not addressed.

Table A11: Back pain interventions – systematic reviews

Citation	Aim/study question	Search strategy	No. of studies included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Beinart et al. (2013)	To identify factors associated with adherence to healthcare practitioner-prescribed home exercise in adults with chronic low back pain	Databases: Embase, PsycINFO, MEDLINE, PEDro, Cochrane Central Register of Controlled Trials (CENTRAL) (up to January 2012) Search terms: physical therapy, physiotherapy, adherence, patient compliance, non-adherence, non-compliance, compliance, low back pain, lower back pain, chronic low back pain, chronic lower back pain, exercise, predictor, barrier	11 RCTs	1088 participants	Moderate evidence for one individual patient sub-factor and three intervention-related sub-factors associated with increased adherence to home exercise. These sub-factors were greater health locus of control, supervision, participation in an exercise program, and participation in a general behaviour change program incorporating motivational strategies.	Lack of standardised measures of adherence to prescribed home exercise. Development of a validated measure of adherence should be a priority because this will provide a better understanding of the multitude of factors that may influence adherence to home exercise.

Citation	Aim/study question	Search strategy	No. of studies included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Brunner et al. (2013)	<p>To detect RCTs investigating CBT-based treatments applied in acute/sub-acute low back pain</p> <p>To analyse methods of the included studies. To identify theory-based treatment strategies which are applicable for physiotherapists</p>	<p>Databases: MEDLINE, Embase, PsycINFO, CENTRAL (updated on Sept 2011)</p> <p>Citation tracking in relevant publications</p> <p>Search terms: randomized controlled trial OR controlled clinical trial OR randomized OR randomly OR trial OR groups; AND low back pain; AND behaviour therapy OR cognitive therapy OR cognitive behaviour therapy OR cognitive behavioural therapy</p>	8 studies	Not reported	<p>Half of the studies suffered from high risk of bias; study characteristics varied in methodology, particularly in terms of treatment design and outcome measures.</p> <p>An operant treatment approach based on principles of operant conditioning (graded activity) was identified as a CBT-based strategy with traceable theoretical justification that can be applied by physiotherapists.</p>	Operant conditioning can be integrated in ambulant physiotherapy practice and is a promising CBT-based strategy for the prevention of chronic lower back pain.

Citation	Aim/study question	Search strategy	No. of studies included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Darlow et al. (2012)	To investigate the association between healthcare provider (HCP) attitudes and beliefs and the attitudes and beliefs, clinical management, and outcomes of this patient population	Databases: MEDLINE, Embase, CINAHL, AMED, PsycINFO, CENTRAL (Jan 1990–March 2010)	17 studies	Not reported	<p>Strong evidence that HCP beliefs about back pain are associated with beliefs of their patients.</p> <p>Moderate evidence that:</p> <ul style="list-style-type: none"> • HCPs with a biomedical orientation or elevated fear avoidance beliefs are more likely to advise patients to limit work/physical activities; less likely to adhere to treatment guidelines • HCP attitudes and beliefs are associated with patient education and bed rest recommendations • HCP fear avoidance beliefs are associated with reported sick leave prescription • Biomedical orientation not associated with no. of sickness certificates issued for lower back pain. 	HCPs need to be aware of the association between their attitudes and beliefs and their clinical management of their patients with lower back pain; and the attitudes and beliefs of their patients with lower back pain.

Citation	Aim/study question	Search strategy	No. of studies included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Du et al. (2011)	To evaluate the effectiveness of self-management programs on pain and disability for chronic musculoskeletal pain conditions	Databases: MEDLINE, Embase (1970s to March 2010) Search terms: (chronic musculoskeletal pain OR arthritis OR osteoarthritis OR rheumatoid arthritis OR fibromyalgia OR back pain OR neck pain OR shoulder pain) AND (self-management OR self-care OR patient education) AND (randomized controlled trial OR random*)	19 RCTs	Not reported	For arthritis: Self-management programs have small to moderate effects in improving pain and disability at the long-term level, but the medium-term effect for disability is not significant. For chronic back pain: Insufficient evidence to determine the effectiveness of self-management programs.	Evidence supports the provision of self-management programs to adult patients with arthritis. Further research is needed on self-management for chronic back pain. Practice implications: Self-management is a safe, community-based and effective way for patients with arthritis to manage pain and disability. Core skills of self-management should be developed using multiple approaches.
Heitz et al. (2009)	To provide an inventory of predictive instruments and their constituting parameters associated with return to work in patients with subacute and chronic non-specific low back pain	Databases: MEDLINE, Embase, CINAHL, CENTRAL, PEDro, PSYINDEX, PsycINFO/PsycLIT, Sociofile (inception to Oct 2008) Reference lists of the included publications; relevant reviews, articles, reports on the topic. 'Related articles' query in MEDLINE	39 studies	Not reported	The studies on subacute patients reported on a total of 56 biomedical factors (63% of which were modifiable) and 61 psychosocial factors (84% of which were modifiable). Corresponding values in studies on chronic patients were 44 biomedical (62% modifiable) and 61 (66% modifiable) respectively.	The interdisciplinary approach in patients at risk to develop persistent NSLBP is justified in both the subacute and chronic disease stages. Psychosocial interventions might be more effective in subacute stages as a higher proportion of modifiable risk factors were identified in that group.

Citation	Aim/study question	Search strategy	No. of studies included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Henrotin et al. (2006)	To determine whether information is an effective preventive action and/or therapy for low back pain and which type of information is most effective	Databases: MEDLINE (1966–2004), PsycINFO, Embase (1988–2004)	11 RCTs	Not reported	<p>Strong evidence that a booklet increases knowledge. Moderate evidence that physician-related cues increase the confidence in a booklet and adherence to exercises.</p> <p>Limited evidence that a biopsychosocial booklet is more efficient than a biomedical booklet to shift patients' beliefs about physical activity, pain and consequences of low back trouble.</p> <p>Strong evidence that booklets are not efficient on absenteeism, and conflicting evidence that they are efficient on healthcare use.</p>	<p>Information based on a biopsychosocial model is recommended in primary care to shift patient beliefs on low back pain.</p> <p>Nevertheless, information delivery alone is not sufficient to prevent absenteeism and reduce healthcare costs.</p>

Citation	Aim/study question	Search strategy	No. of studies included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Iles et al. (2008)	To identify psychosocial predictors of failure to return to work in non-chronic non-specific low back pain	Databases: MEDLINE, Embase, PsycINFO, CINAHL and PEDro (up to April 2006)	24 studies	From 55 to 1068	<p>Strong evidence that recovery expectation is predictive of work outcome and that depression, job satisfaction and stress/psychological strain are not predictive of work outcome.</p> <p>Moderate evidence that fear avoidance beliefs are predictive of work outcome and that anxiety is not predictive of work outcome.</p> <p>Insufficient evidence to determine whether compensation or locus of control are predictive of work outcome.</p>	<p>To predict work outcome in non-chronic NSLBP, psychosocial assessment should focus on recovery expectation and fear avoidance.</p> <p>More research needed to determine the best method of measuring these constructs and to determine how to intervene when a worker has low recovery expectations.</p>
Oliveira et al. (2012)	To determine the effectiveness of self-management for non-specific low back pain	Databases: MEDLINE, Embase, CINAHL, PsycINFO, LILACS, PEDro, AMED, SPORTDiscus, Cochrane (earliest record to April 2011)	8 trials	Not reported	<p>Self-management is endorsed in most guidelines for the management of low back pain.</p> <p>However, only moderate-quality evidence that self-management has small effects on pain and disability in people with low back pain.</p>	Results challenge the endorsement of self-management in treatment guidelines.

Citation	Aim/study question	Search strategy	No. of studies included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Reese & Mittag (2013)	To summarise evidence and recommendations for psychological interventions in the rehabilitation of patients with chronic low back pain	Databases: MEDLINE, PsycINFO, EBMR, AQuMed, AWMF, DAHTA, GIN, SIGN (Jan 1990–Nov 2009) Cochrane Database of Systematic Reviews (Jan 1990–Dec 2011) Manual search of reference lists from a national guideline and a guidelines clearing report	6 SLR 14 guidelines	Not reported	Recommendations and evidence were collected on behavioural therapy, fear avoidance training, stress management, relaxation therapy, patient education and back school. Most available evidence is of moderate to low quality. Some of the older evidence is not applicable to modern interventions using a biopsychosocial approach.	High quality and current evidence needed. Summary of guidelines shows that multimodal, multidisciplinary programs including psychological interventions have become standard in the rehabilitation of patients with chronic low back pain. However, there are few recommendations on which intervention should be considered for which specific problem (problem–treatment pairs).

Citation	Aim/study question	Search strategy	No. of studies included (no. of RCTs)	Total no. of participants	Key findings	Conclusions/recommendations
Van der Wees et al. (2008)	To evaluate the effectiveness of strategies to increase the implementation of physiotherapy clinical guidelines	Databases: MEDLINE (from 1966), Embase (from 1988), CINAHL (from 1982), PEDro, Cochrane Library (Issue 4, 2007) (until Oct 2007) Search was restricted only to three criteria: guidelines AND (implementation OR implement) AND (physiotherapy OR physical therapy)	5 papers based on 3 RCTs	Not reported	Educational meetings were effective in increasing adherence to: <ul style="list-style-type: none"> • Low back pain guidelines: Limiting number of sessions, using active intervention, giving adequate info, increasing activity level, changing attitudes/beliefs about pain. • Whiplash guidelines: Reassuring the patient, advising the patient to act as usual, using functional outcome measures. <p>No evidence that patient health was improved or that the cost of care was reduced.</p>	Multifaceted interventions based on educational meetings to increase implementation of clinical guidelines may improve some outcomes of professional practice but do not improve patient health or reduce cost of care.

Table A12: Back pain interventions – study protocols

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Berenguera et al. (2011)	Spain	Cluster RCT 3, 12 months follow-up	932 patients aged 18–65 years who speak Catalan or Spanish, with non-specific subacute low back pain diagnosis and who do not have a mental illness or cognitive impairment, an impeding disability, anti-inflammatory or allergy and fibromyalgia, and who are not pregnant or breastfeeding will be recruited from 38 primary healthcare centres by GPs and nurses	<p>Intervention:</p> <p>Patients will receive an educational booklet and face-to-face biopsychosocial group intervention involving a GP, nurse, psychologist and physiotherapist (10 hours). The biopsychosocial educational group intervention will:</p> <ul style="list-style-type: none"> • Resolve doubts, clarify low back pain concepts and promote adherence • Provide tools for pain avoidance and improve quality of life • Provide CBT techniques. <p>Control:</p> <p>Patients receive usual clinical care and individual intervention (i.e. clinical guideline recommendations).</p>	<p>To evaluate the cost-effectiveness and cost-utility of a biopsychosocial group education intervention compared to usual care.</p> <p>To identify and quantify costs and cost-distribution of low back pain among the working population.</p>

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Dirmaier et al. (2013)	Germany	RCT 3 months follow-up	414 patients aged 18 years and over who have self-reported chronic low back pain and internet access will be recruited from health insurance companies, pension funds, primary care and specialist practices, hospitals and rehabilitation centres, and self-help groups via newspapers, magazines, patient websites and flyers.	<p>Intervention (interactive health communication application):</p> <p>An online dialogue-based format (inspired motivational interviewing) will be provided with chronically structured content and tone that are individually tailored to the coping style of the patient user (i.e. copings styles were informed by the avoidance-endurance model; health literacy; chronic low back pain knowledge and preferred detail of information).</p> <p>Control (standard website):</p> <p>A standard website, in which tailoring does not occur with regards to the information provided and content is not presented in a dialogue format and without any guidance.</p> <p>IHCA and control offer the following essential information on low back pain:</p> <ul style="list-style-type: none"> • Physiology of pain • Acute vs. chronic pain • Comorbidity • Epidemiology • Psychological aspects • Coping and pain management • Related psychological problems (anxiety and depression) • Diagnostic procedures • Treatment options (pharmacological and non-pharmacological). 	To evaluate a tailored dialogue-based IHCA with chronic low back pain in pain management and compare decision support information to a standard website sans dialogue and tailoring.

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Foster et al. (2010)	UK	Two groups (GPs and patients) Pre-test, post-test	1000 patients (18 years and older with sufficient English skills and non-specific low back pain, and who do not have serious spinal pathology, mental health issues, comorbidities and are not pregnant, will be recruited from 7 general practices.	<p>Phase 1:</p> <ul style="list-style-type: none"> • Assess attitudes and behaviours towards low back pain among GPs and physiotherapists • Observe clinical practice and clinical patient outcomes in 6 month baseline. <p>Phase 2:</p> <ul style="list-style-type: none"> • Educational courses and outreach visits • Regular feedback and support • Target treatments in primary care for low-, medium- and high-risk patients • Installing computerised and paper-based support for subgrouping (i.e. low, medium or high risk) of treatment systems. <p>Phase 3:</p> <ul style="list-style-type: none"> • Assess attitudes and behaviours towards low back pain among GPs and physiotherapists • Observe clinical practice and clinical patient outcomes in 12 month period after implementation of new care system. 	To determine the effectiveness of subgrouping treatment systems on back pain disability and catastrophising at 2 (Phase 1) and 6 months (Phase 3).

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Hentschke et al. (2010)	Germany	Three-armed RCT 10 months follow-up	456 patients aged 18–65 years, who speak sufficient German, with non-specific low back pain (inclusion criteria determined by ICD-10) and who have not had back surgery, a mental illness, an impending disability (visual and/or acoustic) and who are not retiring will be recruited from six inpatient and outpatient chronic back pain rehabilitation facilities and by physicians.	<p>Biopsychosocial chronic pain aftercare intervention (RÜCKGEWINN): patients will receive face-to-face exercise sessions (90 minutes) with three focus areas: attitude and behaviour, guidance of health enhancing physical activity, and improvement of physical fitness.</p> <p>Educational booklet: Patients will receive an educational booklet covering topics such as causes of back pain, pain management, risk factors for back pain and the role of activity.</p> <p>Control (usual care; IRENA): Patients will receive face-to-face outpatient after-care, which can involve resistance training, gymnastics, aquatics, back school and recreational exercise.</p>	<p>To evaluate the effectiveness of a biopsychosocial after-care program for chronic low back pain compared to current usual after-care for low back pain.</p> <p>To assess changes in factors relevant to pain self-management, and their influence on the primary patient outcomes.</p>

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Hofmann et al. (2013)	Germany	RCT 4, 24, 52 weeks follow-up	214 German-speaking patients aged 18–65 years with non-specific chronic low back pain (inclusion criteria determined by ICD-10) and who do not have a specific diagnosis of back pain, comorbidities, reduced sight or hearing, a mental illness and who are planning to retire will be recruited from two participating rehabilitation centres by physicians.	<p>Intervention:</p> <p>In addition to a 27-day (65 hours on average) behavioural medical rehabilitation (BMR), patients will receive face-to-face behavioural exercise therapy (BET) administered by a BET-trained therapist to groups of 6–12, which aims to facilitate health knowledge and skills to further empower patients to maintain an active healthy lifestyle beyond BMR. BET consists of the following modules (26 hours on average):</p> <ul style="list-style-type: none"> • Weightlifting training introduction (2 times per week) • Weightlifting training (3 times over 2–4 weeks) • Aerobic exercise introduction (two times per week) • Aquatic training introduction (2 times per week) • Planning module (3 times over 1–2 weeks) • Individual physical activity/exercise (self-directed over 2–4 weeks). <p>Control:</p> <p>As part of BMR, patients will receive face-to-face standard exercise therapy (SET) administered by a trained therapist, and with additional provisions of information related to health, health behaviour, rehabilitation/social counselling and occupational therapy.</p>	To evaluate the effectiveness of BMR with BET component and BMR with SET component on short-, mid-, and long-term patient outcomes.

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Luedtke et al. (2011)	Germany	RCT 4, 12, 24 weeks follow-up	135 German-speaking patients aged 18–65 years, with non-specific chronic low back pain and who have not had back surgery and who do not have comorbidities, a mental illness, a neurological illness, are not pregnant and dependent on alcohol and other drugs will be recruited and treated at back pain clinic.	<p>Intervention:</p> <p>In addition to standard care*, patients will receive a face-to-face, low-cost portable battery driven stimulator box applied to the skull as required (20 minutes in total) over 5 consecutive days (tDCS).</p> <p>Control:</p> <p>In addition to standard care, patients will receive over 5 consecutive days a face-to-face sham stimulation (i.e. does not deliver active stimulation), which switches off after 30 seconds and does not lead to any neurophysiological changes.</p> <p>*All back pain outpatients at the clinic receive 5-day (5 hours daily) cognitive behavioural group interventions (up to 9 patients per group) consisting of cardiovascular exercises and machine assisted muscle training and trunk stabilisation exercises. Information on neurophysiology of pain, and pain coping and relaxation strategies will be administered by orthopaedics, physiotherapists, psychologists and sports therapists.</p>	<p>To evaluate the effect of tDCS on pain and disability among patients with chronic low back pain.</p> <p>To investigate additive effects of tDCS as pre-treatment on symptom reduction induced by cognitive behavioural group intervention.</p>

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Patel et al. (2011)	UK	RCT 3 months follow-up	A minimum of 150 patients (18 years and older), with sufficient English skills and non-specific low back pain and who do not have a mental illness, comorbidities and serious spinal tumour, infection or fracture will be recruited from a community health centre specialising in physiotherapy by GPs via referral options.	Intervention: In addition to standard care, patients will be provided with a face-to-face decision support package (DSP), administered by a DSP-trained therapist over 3 months, consisting of: <ul style="list-style-type: none"> • Rationale for the interventions • Effectiveness of the interventions • Review guidelines for patients' health status and patients' values on future scenarios. Control: Patients will receive face-to-face standard care from physiotherapists over 3 months.	To evaluate the effectiveness of the DSP on related outcomes for patients with low back pain compared with standard care.
Riis et al. (2013)	Denmark	Two-armed cluster RCT 4, 8, 52 weeks follow-up	100 participating general practices from which 2700 patients (1350 per arm) of sufficient Danish language skills aged between 18–65 years, with low back pain, with or without leg pain, do not have serious pathological issues, are not pregnant will be included (27 per practice).	Intervention: In addition to control group components (see below), general practices in the intervention group (face-to-face, therapist-assisted) will receive: <ul style="list-style-type: none"> • Facilitator (physiotherapist) visits involving role-playing on introducing clinical behaviour change • Patient stratifying tools for risk levels of persistent pain and risk for patient work ability • Feedback on low back pain treatment involving discussion with facilitators about their guideline compliance. Control: General practices receive usual guidelines, i.e. medical education meetings, guideline e-newsletters and invitations to regional information meetings. Passive support also provided, including e-medical record restructuring, reminders for patient inclusion and referring patients for further evaluation.	To evaluate the effect of a complex, multifaceted strategy for low back pain guidelines on secondary care referral and patient outcomes in comparison to simple usual care strategy by: <ul style="list-style-type: none"> • Addressing GPs' psychological capability to treat low back pain (via facilitator visits) • Providing GPs referral options for patients with social needs • Providing a social environment to facilitate change (meetings with facilitators and for continuing medical education) • Support GPs' reflective and emotional motivation (via reminders, feedback and facilitator discussions).

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Rodriguez-Blanco et al. (2010)	Spain	Two-armed cluster RCT 3, 6, 12 months follow-up	38 healthcare centres, from which 932 patients (466 per arm) aged between 18–65 years, with diagnosed non-specific subacute low back pain will be recruited by GPs.	<p>Intervention:</p> <p>In addition to individual intervention, patients will receive an education booklet and a face-to-face biopsychosocial educational group intervention (a total of 10 hours, with a GP, nurse, psychologist and physiotherapist). The biopsychosocial educational group intervention:</p> <ul style="list-style-type: none"> • Resolves doubts, clarifies low back pain concepts and promotes adherence • Provides tools for pain avoidance and improves quality of life • Provides CBT techniques. <p>Control:</p> <p>Patients receive usual clinical care and individual intervention (i.e. clinical guideline recommendations).</p>	To assess the effectiveness of a multidisciplinary intervention on patient outcomes, including disability, pain severity, anxiety and depression, life quality and incidence of low back pain.

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Saper et al.(2014)	US	RCT 6, 12, 26, 40, 52 weeks follow-up	320 low-income minority adults aged 18–64 years with non-specific low back pain lasting more than 12 weeks and a self-reported pain intensity score of more than 4 on a 0–10 scale will be recruited from a hospital and seven qualified community health centres.	<p>Part 1 (12-week treatment)</p> <p>Yoga intervention: Patients will receive a structured, reproducible protocol of one yoga class every week (75 minutes).</p> <p>Physical therapy intervention: Patients will receive individually tailored supervised exercise program with home practice (60 minutes).</p> <p>Education intervention: Patients will receive a 224-page educational, evidence-based self-care book.</p> <p>Part 2 (40-week maintenance)</p> <p>Yoga intervention: Patients will be encouraged to attend weekly (75 minutes) yoga classes.</p> <p>Physical therapy intervention: Patients randomised to structured PT maintenance program will receive booster sessions similar to those in the treatment phase at months 4, 6, 8, 12, and patients randomised to the no structure PT program will receive booster sessions.</p>	<p>To compare the effectiveness of yoga, physical therapy and self-care education book on low back pain.</p> <p>To compare the effectiveness of yoga and physical therapy maintenance program (structured and no structure) on patient outcomes.</p> <p>To determine the cost-effectiveness of yoga, physical therapy and education for adults with low back pain at 12 weeks, 6 months and 12 months.</p>

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Schmidt et al. (2010)	Germany	Cluster RCT 6, 12 months follow-up	600 patients aged 20–60 years, with low back pain (eligibility assessed by nurses) and who do not have specific back pain, have not had back pain treatment in the previous 3 months, do not have comorbidities, are not planning to retire, will be recruited from 20 participating medical practices by GPs.	<p>Intervention:</p> <p>Patients will be provided with a risk-factor screening, risk-tailored information and counselling sessions, and a telephone/email consultation for back pain. Three risk-tailored clusters;</p> <p>Low risk intervention (1):</p> <p>In addition to usual care, patients will receive advice on staying active and be provided with a self-care booklet.</p> <p>Physical risk intervention (2):</p> <p>In addition to usual care, advice and self-care booklet, patients will be invited to a guideline-based, therapist-assisted intervention consisting of 2 meetings (120 minutes each) which focus on ‘back myths’, risk factors, introduction to self-controlled exercise and staying active strategies.</p> <p>Psychological risk intervention (3):</p> <p>In addition to usual care, advice and self-care booklet, patients will be invited to 2 meetings for up to 6 patients (120 minutes each) involving pain-focused cognitive behavioural intervention conducted by psychologists.</p> <p>Control:</p> <p>Patients (recruited in different practices) will receive usual care.</p>	To evaluate the effectiveness of a tailored intervention for key outcomes (i.e. functional capacity, sick leave, self-care, negative pain cognitions and healthcare service use) among patients with acute or subacute low back pain in primary care compared to standard care.

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
Sherman et al. (2010)		RCT 6, 12, 26 weeks follow-up for psychological mediators	210 patients aged 20–64 years, with sufficient English and non-specific low back pain, and who do not have comorbidities, an impending disability, mental health issues and who are not pregnant will be recruited from primary care clinics by GPs via mailed invitations.	<p>Yoga intervention (1):</p> <p>Patients will receive 12 weekly 75-minute structured yoga sessions (face-to-face, instructor-assisted) focusing on 6 posture sequences designed for people with low back pain using the principles of viniyoga and will be asked to practise 20 minutes daily using DVD for intervention optimisation.</p> <p>Physical exercise intervention (2):</p> <p>Patients will receive 12 weekly 75-minute physical exercise sessions (face-to-face, therapist-assisted), which will increase in strength resistance, consisting of 15 stretching exercises, and printed handouts and a DVD for safe practice at home.</p> <p>Control:</p> <p>Patients will receive a 224-page educational, evidence-based self-care book.</p>	<p>To assess the effectiveness of yoga as treatment for low back pain compared with self-care and exercise treatment options.</p> <p>To identify mechanisms associated with the benefits of yoga for low back pain treatment.</p>

Citation	Country	Study design	Study population & recruitment	Intervention design	Aim/study question
van der Roer et al. (2004)	The Netherlands	RCT 6, 13, 26, 52 weeks follow-up	280 Dutch (living and working in Amsterdam) patients with health insurance, aged 18–65 years, who have non-specific low back pain, are not pregnant and have been advised to not perform physically demanding tasks by GPs or medical specialists, and are not dealing with a lawsuit related to their back pain or work-related injury will be recruited from primary physiotherapy care facilities by physiotherapists (n = 85; 40 will provide intensive group training and 45 will provide usual care).	<p>Intervention:</p> <p>Patients will be provided with a combination of face-to-face, therapist-assisted exercise therapy (back school principles are incorporated) and behavioural therapy, including group lessons focusing on risk factors of back pain, advice on staying active and managing pain relapse, and operant conditioning and graded activity, respectively. The protocol has a total of duration of 30 weeks and entails 3 phases:</p> <ul style="list-style-type: none"> • Starting phase (3 weeks); 6 planned introductory sessions • Treatment phase (twice a week for 8 weeks); gradually increasing exercise program, with operant conditioning component • Generalisation phase; patients apply what they learnt into their daily routine. <p>Control:</p> <p>Patients will receive face-to-face, therapist-assisted, usual care for low back pain consisting of recommendations for staying active, exercise therapy and providing patients with adequate low back pain information.</p>	To evaluate the cost-effectiveness and cost-utility of the intensive group training intervention compared to the usual care provided by physiotherapists.