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Cochrane Database of Systematic Reviews 2013, Issue 9. Art. No.: CD010393.

DOI: [10.1002/14651858.CD010393.pub2](https://doi.org/10.1002/14651858.CD010393.pub2).

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[Intervention Review]

Face-to-face versus remote and web 2.0 interventions for promoting physical activity

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Contact: Charles Foster, charlie.foster@bristol.ac.uk.**Editorial group:** Cochrane Heart Group.**Publication status and date:** Stable (no update expected for reasons given in 'What's new'), published in Issue 6, 2021.**Citation:** Richards J, Thorogood M, Hillsdon M, Foster C. Face-to-face versus remote and web 2.0 interventions for promoting physical activity. *Cochrane Database of Systematic Reviews* 2013, Issue 9. Art. No.: CD010393. DOI: [10.1002/14651858.CD010393.pub2](https://doi.org/10.1002/14651858.CD010393.pub2).

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ABSTRACT

Background

Face-to-face interventions for promoting physical activity (PA) are continuing to be popular as remote and web 2.0 approaches rapidly emerge, but we are unsure which approach is more effective at achieving long term sustained change.

Objectives

To compare the effectiveness of face-to-face versus remote and web 2.0 interventions for PA promotion in community dwelling adults (aged 16 years and above).

Search methods

We searched CENTRAL, MEDLINE, EMBASE, CINAHL, and some other databases (from earliest dates available to October 2012). Reference lists of relevant articles were checked. No language restrictions were applied.

Selection criteria

Randomised trials that compared face-to-face versus remote and web 2.0 PA interventions for community dwelling adults. We included studies if they compared an intervention that was principally delivered face-to-face to an intervention that had principally remote and web 2.0 methods. To assess behavioural change over time, the included studies had a minimum of 12 months follow-up from the start of the intervention to the final results. We excluded studies that had more than a 20% loss to follow-up if they did not apply an intention-to-treat analysis.

Data collection and analysis

At least two review authors independently assessed the quality of each study and extracted the data. Non-English language papers were reviewed with the assistance of an interpreter who was an epidemiologist. Study authors were contacted for additional information where necessary. Standardised mean differences (SMDs) and 95% confidence intervals (CIs) were calculated for continuous measures of cardio-respiratory fitness.

Main results

One study recruiting 225 apparently healthy adults met the inclusion criteria. This study took place in a high-income country. From 27,299 hits, the full texts of 193 papers were retrieved for examination against the inclusion criteria. However, there was only one paper that met the inclusion criteria. This study reported the effect of a PA intervention on cardio-respiratory fitness. There were no reported data for PA, quality of life, or cost effectiveness. The difference between the remote and web 2.0 versus face-to-face arms was not significant (SMD

-0.02; 95% CI -0.30 to 0.26; high quality evidence). The risk of bias in the included study was assessed as low, and there was no evidence of an increased risk of adverse events.

Authors' conclusions

There is insufficient evidence to assess whether face-to-face interventions or remote and web 2.0 approaches are more effective at promoting PA.

PLAIN LANGUAGE SUMMARY

Face-to-face versus remote and web 2.0 interventions for promoting physical activity

Participating in insufficient amounts of physical activity leads to an increased risk of a number of chronic diseases, and physical and mental health problems. Regular physical activity should be a goal for all adults and it can provide social, emotional and physical health benefits. The majority of adults are not active at recommended levels. We looked at studies that had compared two approaches to promoting physical activity (face-to-face with a professional versus using technologies that enabled remote prescription) to decide which approach was better. We know from other work that both approaches are successful. We found only one study with 225 apparently healthy adults in the medical literature to answer our question. Therefore, we remain unclear about which approach is best for promoting physical activity and cardio-respiratory fitness. We are also unable to comment authoritatively on adverse events and the influence of the delivery method.

SUMMARY OF FINDINGS

Summary of findings 1. Overview of Reviews

Interventions for [Condition] in [Population]

Outcomes	Intervention and Comparison intervention	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
		Assumed risk	Corresponding risk				
		Remote Intervention	Face-to-face				
Cardiorespiratory Fitness: 12 Months							
	Face-to-face/Remote Intervention	The mean cardiorespiratory fitness: 12 months in the intervention groups was 0.02 standard deviations lower (0.3 lower to 0.26 higher)			225 (1 study)	⊕⊕⊕⊖ moderate	SMD -0.02 (-0.3 to 0.26)

King 1991 was assessed as being at high risk of bias for not reporting attrition data and not ITT analysis

BACKGROUND

This review compared face-to-face versus remote and web 2.0 interventions that promote physical activity (PA). It is part of a suite of three complementary reviews that provide both an update and a progression for the previously completed Cochrane review assessing 'Interventions for promoting physical activity' (Foster 2005a). The titles of the other reviews in this suite are:

1. 'Face-to-face interventions for promoting physical activity'; and
2. 'Remote and web 2.0 interventions for promoting physical activity'.

The evidence base for both face-to-face PA promotion and remote and web 2.0 interventions is rapidly growing and diverging. This review enabled a head-to-head comparison between these intervention approaches for promoting PA. In contrast, the accompanying two reviews focused on comparisons of each of these delivery methods to true control groups. In all of the reviews we also considered how the effectiveness of PA interventions is influenced by implementing the intervention in a group or individually. The paradigm through which we approached these different methods of PA intervention delivery in this suite of reviews is summarised below (Figure 1).

Figure 1. Delivery of PA interventions described according to interaction with implementer and other participants.

Interaction with other intervention participants	Interaction with the intervention implementer		
	Face-to-Face		Remote and Web 2.0
Group	Review 1 (versus control)	Review 3 (head-to-head)	Review 2 (versus control)
Individual			
Mixed (i.e. combined group and individual)			

Description of the condition

The health benefits of adequate levels of PA have been well documented (WHO 2010a). Previous systematic reviews and meta-analyses of observational studies have demonstrated the role of PA in the prevention and treatment of coronary heart disease, hypertension, stroke, type II diabetes, obesity, metabolic syndrome, breast cancer, colon cancer, osteoporosis, falls, depression, anxiety and negative self-concept (Haskell 2007; Janssen 2010; Kesaniemi 2001; Nelson 2007; Strong 2005; Warburton 2006; Williams 2001). It is estimated that in 2008 physical inactivity caused 9% of premature mortality and 5.3 million deaths worldwide (Lee 2012). This included between 6% and 10% of all deaths from major non-communicable diseases globally. The burden of such diseases is increasing rapidly in low- and middle-income countries (Lee 2012; WHO 2010b).

The World Health Organization (WHO) recommends that adults should accumulate at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity PA, or an equivalent combination of aerobic PA, throughout the week (WHO 2010a). This should be achieved in bouts of at least 10 minutes duration (WHO 2010a). Muscle strengthening activities involving the major muscle groups are also recommended on at least two days per week (WHO 2010a). Investigations into the dose-response relationship indicate that PA at levels higher than the minimum recommendations confer greater health benefit (Kesaniemi 2001; WHO 2010a).

The available data suggest that 31.1% of the world's adult population are not meeting the minimum recommendations for PA (Hallal 2012). The direct economic burden of physical inactivity is 1.5% to 3.0% of healthcare system costs and it is an emerging expense in low- and middle-income countries (Oldridge 2008). It has been estimated that increasing the number of people that achieve the WHO PA recommendations by 10% or 25% would prevent more than 553,000 or 1.3 million deaths, respectively, globally each year (Lee 2012).

Description of the intervention

It has long been accepted that various interventions can promote PA participation and improve health (Dishman 1996). This finding has prompted growing global interest and investment in PA interventions by different stakeholders using a variety of methods (Heath 2012). It is evident that there are opportunities to influence personal, social and environmental determinants of PA in different contexts and populations (Bauman 2012). A previous Cochrane review found that PA interventions had a moderate effect on participation levels (Foster 2005a). Conclusions could not however be drawn about the effectiveness of isolated components for achieving and maintaining recommended levels of PA in the population.

For the purposes of this review an intervention is any deliberate attempt to increase the PA levels of the participants. It may be delivered using various methods and implemented through a broad range of professions (for example health professional,

exercise specialist, PA researchers). This is consistent with the principles of the previous versions of this review (Foster 2005a). Face-to-face approaches are those that are delivered in person and they use different methods to remote and web 2.0 interventions, which do not involve a personal interaction with the implementer. Remote and web 2.0 strategies typically involve 'pushing' tailored information via e-mail or short message service (SMS) from a central source to the participants (Waller 2006). Either approach can be delivered to groups or individually and several examples are presented below (Table 1).

How the intervention might work

One of the earliest reviews of determinants of PA stated that few interventions or adherence studies were based on any theoretical or psychological models (Dishman 1990). However, when the review was repeated four years later the authors noted a marked increase in the use of theories in studies and interventions (Dishman 1994). It is now accepted that well designed PA interventions are based upon behavioural theories (Bartholomew 2001) but understanding how these are translated into practical strategies needs further evaluation (Foster 2005a). Behavioural theories provide a foundation for an intervention that can explain the drivers of PA behaviour and potential pathways for change (Foster 2005b). They also inform the planning, development and implementation of PA interventions, and the majority of studies have adopted social psychology theories (Biddle 2011).

Face-to-face approaches and remote and web 2.0 interventions appear to be grounded in similar behavioural theory. As interventions have shifted towards remote delivery they have adopted several theories that were previously established for face-to-face approaches to PA promotion. These include the Health Belief Model (HBM) (Becker 1974); the Theory of Reasoned Action/Planned Behaviour (TRA) (Fishbein 1975); Social Cognitive Theory (SCT) (Bandura 1986); and the Transtheoretical Model of behaviour change (TTM) (Prochaska 1982). These models have 'conceptual convergence' (Biddle 2001) and share two common constructs (Rodgers 1991):

1. outcome expectancy, the belief that the behaviour will lead to a specific outcome;
2. social norms, the influence of expected behaviours within a social group.

More recently other theories have been applied to face-to-face interventions, while the use of computers as persuasive technologies has created its own brand of science known as captology (Fogg 2002; Fogg 2007; Waller 2006).

It appears to be the mode of delivery rather than the underlying behavioural theory that sets apart face-to-face approaches from remote and web 2.0 interventions. Several examples of both strategies were described previously (Table 1). Although both types of approaches are dependent on varying the dose of the intervention components, the frequency and duration of the intervention may be different when implemented remotely and may also be augmented by flexibility in the delivery timing (Waller 2006). This may contribute to the consistent results of systematic reviews demonstrating the effectiveness of internet based PA interventions (Norman 2007; Portnoy 2008; Vandelanotte 2007). A recent meta-analysis identified the inclusion of educational components as the only factor that contributed significantly

to the increased intervention effectiveness of internet-delivered strategies (Davies 2012).

Another significant difference between a face-to-face approach and remote intervention is that the interaction of the participants (for example therapist and client, professional and patient, PA promoter and participant) generates empathy (Miller 2012). Empathy is seen in personal counselling as a key factor to predicting a successful outcome, and its three key elements are (Rogers 1969):

1. the therapist understands the client's feelings;
2. the therapist's responses reflect the client's mood and the content of what has been said;
3. the therapist's tone of voice conveys the ability to share the client's feelings.

Although the elicitation of empathy may be possible via a remote intervention, the personal interaction is removed. The more inherent nature of empathy in face-to-face approaches may make these face-to-face interventions more effective at building social support and developing self-efficacy for engaging in PA (McAuley 1994).

Why it is important to do this review

Although it is known that the behaviour of individuals can be influenced by PA interventions, the most effective delivery method is not clear (Foster 2005a). In recent times there has been an emergence of remotely delivered interventions, which have accelerated with the advent of web 2.0 technology (van den Berg 2007). This impetus has displaced several more traditional face-to-face methods of implementing PA interventions (van den Berg 2007).

It is intended that this review will provide an up-to-date indication of the effectiveness of face-to-face versus remote and web 2.0 PA interventions. Understanding the effectiveness of these different approaches to implementation should influence PA policy makers and professionals. Completing this update ensures that the most effective implementation methods are identified. These are integral to optimising health related outcomes associated with the promotion of PA participation.

OBJECTIVES

Primary

To compare the effectiveness of face-to-face versus remote and web 2.0 interventions for physical activity (PA) promotion in community dwelling adults (aged 16 years and above).

Secondary

If sufficient data exist, the following secondary objectives will be assessed.

1. Does delivering the intervention to a group versus individually versus mixed (a combination of group and individually) influence the effectiveness in changing PA?
2. Does the professional delivering the intervention (for example health professional, exercise specialist) influence the effectiveness in changing PA?
3. Does specifying PA type (for example walking, jogging, aerobics) influence the effectiveness in changing PA?

METHODS

Criteria for considering studies for this review

Types of studies

Randomised trials that compared face-to-face versus remote and web 2.0 PA interventions for community dwelling adults. We included studies if they compared an intervention that was principally delivered face-to-face to an intervention that had principally remote and web 2.0 methods. To assess behavioural change over time the included studies had a minimum of 12 months follow-up from the start of the intervention to the final results. We excluded studies that had more than a 20% loss to follow-up if they did not apply an intention-to-treat analysis.

Types of participants

Community dwelling adults who were aged from 16 years to any age and free from pre-existing medical conditions, or with no more than 10% of participants with pre-existing medical conditions that may have limited participation in PA.

We excluded interventions on trained athletes or sports students.

We only included studies that measured PA at an individual level.

Types of interventions

Face-to-face PA interventions could be delivered using supervised methods (for example an exercise class) or an unsupervised approach (for example home exercise programme), or both. Remote and web 2.0 PA interventions could be delivered using recently developed technologies (for example internet, smart phones) or more traditional methods (for example telephone, mail-outs), or both. Web 2.0 interventions have been categorised as more interactive applications that encourage higher levels of user involvement than web 1.0 internet programmes (O'Reilly 2005). The interventions could be delivered to groups or individuals. They could involve one-off or ongoing interactions between the implementer and the participants that included:

- counselling or advice, or both;
- self-directed or prescribed exercise, or both;
- home based or facility based exercise, or both;
- written education or motivational support material, or both.

We excluded mass media and multiple risk factor interventions.

Types of outcome measures

Primary outcomes

The primary outcomes of this review included data that assessed change between baseline and follow-up for:

- cardio-respiratory fitness (CF), which is often used as a marker for PA and demonstrates similar associations with health related outcomes (Blair 2001). It was either estimated from a submaximal fitness test or recorded directly from a maximal fitness test. CF was typically expressed as a VO_2 max score, which is an abbreviation for maximal oxygen uptake (ml/kg/min or ml/min);
- PA levels expressed as an estimate of total energy expenditure (kcal/kg/week or kcal/week), total minutes completed at a

moderate or vigorous intensity, the proportion that reached a predetermined threshold level (for example meeting current public health recommendations), or frequency of participation. PA could be assessed using objective methods (for example accelerometers, pedometers) or more subjective tools (for example PA diary, survey), or both.

The 12 month outcomes were included in the analysis.

Secondary outcomes

The secondary outcomes of this review included data relevant to:

1. quality of life (for example quality-adjusted life years (QALYs));
2. cost (for example cost-benefit, cost-utility);
3. adverse events (for example musculoskeletal injury, cardiovascular event).

Search methods for identification of studies

Electronic searches

We searched the following databases between 9 October 2012 and 11 October 2012:

- CENTRAL (Issue 9 of 12, September 2012) in *The Cochrane Library*;
- MEDLINE (Ovid) (1946 to week 4 September 2012);
- EMBASE Classic and EMBASE (Ovid) (1947 to Week 40 2012);
- CINAHL Plus with Full Text (EBSCO);
- PsycINFO (Ovid) (1806 to week 1 October 2012);
- Web of Science.

We based the search on the previous methods used for the 'Interventions for promoting physical activity' Cochrane review (Foster 2005a) (Appendix 1) and updated them with some amendments (Appendix 2).

The Cochrane randomised trial filter (sensitivity maximising) was applied to MEDLINE (Ovid), and search terms as suggested in the *Cochrane Handbook for Systematic Reviews of Interventions* were used to limit the search to randomised trials in EMBASE (Ovid) (Lefebvre 2011). Adaptations of these filters were used in the other databases except for CENTRAL.

We did not apply any language restriction to the searches.

Searching other resources

We conducted handsearching for the International Journal of Behavioural Nutrition and Physical Activity (February 2004 to October 2012). The reference lists of all relevant articles identified during the search were checked by the authors. We also used published systematic reviews of PA interventions as a source for identifying randomised trials.

We communicated directly with authors to identify and request unpublished studies and data. A comprehensive list of relevant articles along with the inclusion criteria for the review were sent to the first author of each paper that met the inclusion criteria to ask if they knew of any additional published or unpublished studies which were relevant.

Data collection and analysis

Selection of studies

Two authors (CF, JR) independently manually screened the titles identified in the initial search to exclude those that were obviously outside the scope of the review. The authors were conservative at this stage and where disagreement occurred the citation was included for abstract review. Two authors (CF, JR) independently reviewed the abstracts of all citations that passed the initial title screening. They applied the following inclusion criteria to determine if the full paper was needed for further scrutiny.

Did the study:

1. aim to examine the effectiveness of a PA or CF promotion strategy to increase PA or CF levels;
2. have groups that were principally exposed to face-to-face versus remote and web 2.0 methods to promote PA;
3. allocate participants to either intervention group using a method of randomisation;
4. include adults aged 16 years and older;
5. recruit community dwelling adults that were free of chronic disease or with no more than 10% of participants with pre-existing medical conditions that may limit participation in PA;
6. have a follow-up period of at least 12 months between commencing the intervention and measuring the outcomes;
7. analyse the results by intention to treat or, failing that, was there less than 20% loss to follow-up.

The authors were conservative at this stage and where disagreement occurred the citation was included for full text review. Two authors (CF, JR) reviewed the full texts of all studies that passed the abstract screening, using the inclusion criteria described above, to identify a final set of eligible studies. The studies included in the previous 'Interventions for promoting physical activity' Cochrane review were also allocated within the new suite of reviews by two authors (CF, JR) ([Foster 2005a](#)). When there was persisting disagreement it was resolved by consensus after a third author (MH or MT) reviewed the study in question. Publications and reports that utilised the same data were linked to avoid replication in the analysis.

Data extraction and management

The data extraction form was independently piloted by two authors (CF, JR) and subsequently adjusted to ensure it captured the relevant data. One author (CF or JR) and a Research Fellow from the Warwick Medical School (NF) independently extracted the data from all of the selected studies using the standard form. When there was disagreement a third author reviewed the study and consensus was reached (CF or JR, the author out of these two that did not do the initial data extraction). We separately extracted the data from multiple publications of the same study and then combined them to avoid replication. Any missing or ambiguous data were clarified with the study first author via e-mail.

Assessment of risk of bias in included studies

The risk of bias was only assessed and reported for studies that met the inclusion criteria ([Higgins 2011](#)).

Two authors (CF, JR) assessed the risk of bias. Where there was disagreement between the review authors in the risk of bias

assessment, a third author (MH or MT) was asked to independently appraise the study and discrepancies were resolved by consensus between all three authors.

We assessed the studies for the five general domains of bias: selection, performance, attrition, detection, and reporting.

Quality scores were allocated for:

1. allocation sequence generation;
2. allocation concealment;
3. incomplete outcome data;
4. selective outcome reporting;
5. comparable groups at baseline;
6. contamination between groups;
7. validated outcome measures;
8. outcome measure applied appropriately;
9. final analysis adjusted for baseline PA levels;
10. outcome assessment that was independent and blinded;
11. intention-to-treat analysis.

When sufficient information was available, we classified each study as at 'high' or 'low' risk of bias for each item. When there was a lack of information or uncertainty over the potential for bias, we described the domain as 'unclear'. We judged the quality of the evidence as 'low', 'medium', or 'high' after giving consideration to the study design and size, and the potential impact of the identified weaknesses noted in the risk of bias table for each study.

Measures of treatment effect

The included study had a continuous outcome and we expressed the effect size using the standardised mean difference (SMD) between the post-intervention values of the randomised groups. There were no relevant dichotomous outcomes in the included study. We completed a narrative summary of the study results but there were insufficient data to complete a formal meta-analysis.

Unit of analysis issues

We analysed the means and standard deviations (SDs) provided in the current study. Since the study had more than one remote arm, we combined the data from these related study arms. We calculated the mean and SD according to the overall numbers within each arm using established approaches ([Higgins 2008](#)).

Dealing with missing data

We excluded studies that had a high degree of incomplete data (that is less than 40% of data) during the risk of bias assessment or when it appeared that the missing data were likely to be associated with the reported intervention effect. We contacted the authors of potentially included studies if missing data were unclear or data had not been fully reported. Missing data were captured in the data extraction form and reported in the risk of bias table.

Assessment of heterogeneity

As there was only one included study there was no need to assess heterogeneity.

Assessment of reporting biases

As there was only one included study we were unable to conduct an assessment of reporting biases.

Data synthesis

As there was only one included study we did not synthesise the data. In future updates we plan to report all continuous outcomes on the original scale. If the outcomes are combined from different scales we will standardise them as required for the analysis. We will only complete a meta-analysis when the data are clinically homogeneous and we will follow established Cochrane methods (Deeks 2011). If data are available, sufficiently similar, and of adequate quality, we will use the Cochrane Collaboration's statistical software, [Review Manager 2012](#), to perform the statistical analyses. We will use a random-effects model as the default to incorporate heterogeneity between studies. We will not combine evidence from differing study designs and outcome types in the same forest plot (Christinsen 2009).

Subgroup analysis and investigation of heterogeneity

There were insufficient data to perform a subgroup analysis.

Sensitivity analysis

As there was only one included study, we were unable to do a sensitivity analysis. In future updates we will conduct a sensitivity analysis for studies that definitively meet at least 50% of the applicable criteria reported in the 'Risk of bias' tables.

RESULTS

Description of studies

See 'Characteristics of included studies'; 'Characteristics of excluded studies'; 'Characteristics of studies awaiting classification'; 'Characteristics of ongoing studies'

Results of the search

From 27,299 de-duplicated hits, the full texts of 193 papers were retrieved for examination against the inclusion criteria ([Figure 2](#)). There was one paper that met the inclusion criteria ([King 1991](#)).

Figure 2. Study flow diagram.

All searches were completed in October to November 2012. The results of the searches of the electronic databases are given in [Table 2](#).

Included studies

A total of 225 apparently healthy adults participated in the included study. The study included both genders and targeted adults aged 50 to 65 years. Participants were recruited from the community in a high-income country and only 11% of the participants were of a non-white ethnicity.

The face-to-face intervention was delivered to a group by a supervising physical educator at a local community senior centre. The participants attended exercise classes at least three times per week for 12 months. In contrast, the remote intervention was home based and was delivered individually without direct supervision. It included telephone calls that were weekly for the initial four weeks, biweekly for the next four weeks, and then monthly for 12 months. The remote intervention comprised two groups, a high intensity and a low intensity group, which were combined for data analysis. The change in cardio-respiratory fitness at 12 months was the primary outcome measure.

The eligible study was also included in the Foster 2005a review ([King 1991](#)).

Excluded studies

The reasons for excluding papers that underwent full text review are outlined in the 'Characteristics of excluded studies' table. Three main reasons contributed to more than 75% of the exclusions. The most prevalent reason was less than 12 months follow-up ($n = 78$), followed by no appropriate control or intervention group ($n = 37$) or a remote and web 2.0 intervention only ($n = 31$). There was also one study awaiting classification because data analysis had not been completed at the time of this review ([Heesch 2004](#)).

Risk of bias in included studies

We assessed the risk of bias of [King 1991](#) as low, see [Table 3](#) and [Table 4](#).

Allocation

[King 1991](#) used a randomised trial design and was assessed to have had an adequate approach to allocation sequence generation. [King 1991](#) also reported comparable groups at baseline for important confounders or covariates.

Blinding

We did not rate [King 1991](#) on whether participants were blind to their group allocation because it is very difficult to blind participants to a PA intervention. We did assess [King 1991](#) as at low risk of performance bias because its outcome assessments were performed independently and by an assessor who was blinded to the participant allocation status. [King 1991](#) was also judged to have a low risk of detection bias. This was an assessment of the validity and quality of the outcome measures, which were also assessed on their appropriateness of application for the participants.

Incomplete outcome data

[King 1991](#) was assessed as being at high risk of bias for not reporting attrition data.

Selective reporting

[King 1991](#) was assessed to have a low risk of reporting bias.

Other potential sources of bias

Other potential sources of bias included two criteria used in our earlier version of this review ([Foster 2005a](#)). These were: adjusting the final results for baseline values of PA, and adopting an intention-to-treat analysis approach.

Adjusting for baseline values of PA is particularly important in behaviour change studies as there is a likelihood of overestimating effects if baseline adjustment is not performed when using dichotomous outcome measures (for example per cent of adults achieving recommended level of PA). [King 1991](#) was assessed as having a low risk of bias for this criterion.

Intention-to-treat analysis underpins the principles of a randomised trial design to minimise bias. Therefore, we considered failure to include all randomised participants in the final outcome analysis within in their allocated group as a critical risk of bias. [King 1991](#) was assessed as not meeting this criterion, however the proportion of participants in [King 1991](#) who were lost to follow up was 15.9%.

Effects of interventions

See: [Summary of findings 1 Overview of Reviews](#)

Cardio-respiratory fitness

[King 1991](#) (225 participants) reported the effect of their intervention on cardio-respiratory fitness. The effect for the remote and web 2.0 versus the face-to-face arms was not significant (SMD -0.02; 95% CI -0.30 to 0.26), see [Analysis 1.1](#). However, [King 1991](#) reported a significant difference in VO_2 max between the remote and web 2.0 intervention group and the control group at 12 months follow-up (SMD 0.59; 95% CI 0.31 to 0.87). A significant difference in VO_2 max between the face-to-face intervention group and the control group at 12 months follow-up was also reported (SMD 0.57; 95% CI 0.24 to 0.89).

Quality of life

[King 1991](#) did not report any quality of life measures, see [Table 5](#).

Cost effectiveness

[King 1991](#) did not reported data for cost effectiveness, see [Table 6](#).

Adverse events

[King 1991](#) did report data on adverse events, see [Table 7](#). PA related non-cardiac injuries were few and were similar in number across the study arms. These included mild muscular fatigue, strain, or soreness during the initial three to four months of the intervention across both PA arms.

Secondary objectives

See [Table 8](#) and [Table 9](#)

For the face-to-face intervention, [King 1991](#) organised group based training provision by community exercise instructors with physical education degrees. They also individually followed-up the participants in this study arm. Therefore, they used a mixture of

both individual and group based activities within the face-to-face arm and we were unable to establish any independent effects for individual versus group delivery.

King 1991 did compare the difference in adherence to prescribed PA sessions between the participants who were prescribed home based versus facility based exercise. A greater number of participants completed at least 75% of the prescribed exercise sessions in the home based arms compared to the facility based arm ($P < 0.05$). This improved adherence for the home based exercise sessions was not reflected in greater improvements in fitness. This monitoring of fidelity to the prescription and the intervention dose was a good example of the process evaluation needed to potentially explain any differences between intervention groups.

Greater effects were seen on improvements in cardio-respiratory fitness for women as compared to men.

DISCUSSION

Summary of main results

We found one study (225 participants) that has examined the comparative effectiveness of remote and web 2.0 interventions versus face-to-face interventions for promoting PA (King 1991). This study reported the effect of a PA intervention on cardio-respiratory fitness. The effect for the remote and web 2.0 versus face-to-face arms was not significant. However, King 1991 reported a significant difference in VO_2 max when comparing each of the intervention arms to a separate true control group at 12 months follow-up. We were unable to find any additional and more up-to-date studies that have tried to assess the comparative effectiveness of remote and web 2.0 interventions versus face-to-face interventions for promoting PA over a 12 month period. We recognise that our inclusion criteria excluded a large number of studies due to a shorter than 12 months follow-up ($n = 78$) and the lack of an appropriate control or intervention group ($n = 37$).

Overall completeness and applicability of evidence

Our conclusions are limited because we found only one study that was delivered in a high-income country to older, mainly white adults ($n = 11\%$ non-white) who were living in northern California.

Quality of the evidence

King 1991 was included in our previous review of interventions to promote PA to adults (Foster 2005a). The study used an objective and valid assessment of cardiovascular fitness, which was applied appropriately. Despite a high risk of attrition bias, the other sources of bias that could be assessed were at low risk and the quality of the evidence was deemed to be high.

Potential biases in the review process

One limitation of this review is potential publication bias. Other types of interventions may exist but have not been submitted or accepted for publication, or only those with positive results have been published. We were unable to assess publication bias from a single study.

Agreements and disagreements with other studies or reviews

We are unable to make any significant comparisons with other studies or reviews. Our decision to assess the effectiveness of remote and web 2.0 interventions versus face-to-face interventions for promoting PA seems a little ambitious when using our inclusion criteria, particularly the length of follow-up. There may be an arguments for us to seek studies with perhaps up to six months follow-up. However, it is very likely that such a review would be hampered by the same study limitations found in our previous review of interventions to promote PA for adults (Foster 2005a). These were a lack of intention-to-treat analyses and failure to examine the interaction between baseline levels of PA and exposure to the intervention. It is also possible that studies with shorter lengths of follow-up would be more likely to report positive changes in PA that decline between six and 12 months.

AUTHORS' CONCLUSIONS

Implications for practice

There is insufficient evidence to assess whether face-to-face interventions or remote and web 2.0 approaches are more effective at promoting PA.

Implications for research

The lack of high quality randomised trials to assess the effectiveness of remote and web 2.0 interventions versus face-to-face interventions for promoting PA indicates a gap in the evidence base. Future studies should look to initiate PA behaviour change (using established effective strategies) by face-to-face methods (for example counselling) versus a computerised intervention (for example automated e-mail of the PA prescription). Follow-up should be for at least 12 months with assessment of participant compliance and fidelity to the intervention components, and economic costs data. Studies should seek out adults from groups not typically served by current PA interventions.

ACKNOWLEDGEMENTS

The authors wish to acknowledge Karen Rees, Nadine Flowers and the Cochrane Heart Group for their contributions and support during the planning of this suite of reviews.

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CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

King 1991

Study characteristics

Methods	
Participants	Inactive community older volunteers aged 50-65 years
Interventions	The face-to-face intervention was delivered to a group by a supervising physical educator at a local community senior centre. The participants attended exercise classes at least three times per week for 12 months. In contrast, the remote intervention was home based and was delivered individually without direct supervision. It included telephone calls weekly for the initial four weeks, biweekly for the next four weeks, and then monthly for 12 months. The remote intervention comprised a high intensity and a low intensity group that were combined for data analysis.
Outcomes	Cardio-respiratory fitness
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Participants were randomly assigned to one of the four exercise training conditions using a computerised version of the Efron procedure
Allocation concealment (selection bias)	High risk	Not stated
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Clear presentation of participant numbers at each stage of trial
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Assessment staff were blind to the results of the subjects' previous visits
Incomplete outcome data (attrition bias) All outcomes	High risk	All outcomes reported
Selective reporting (reporting bias)	Low risk	All outcomes stated were analysed
Other bias	Low risk	Validated outcome measures

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Aggarwal 2010	Multiple risk factor intervention
Aittasalo 2004	Face-to-face intervention only
Aittasalo 2006	Less than 12 months follow-up
Akiyama 2007	Less than 12 months follow-up
Albright 2005	No appropriate control or intervention group
Albright 2012	No appropriate control or intervention group
Andersen 2012	Less than 12 months follow-up
Anderson 2005	No appropriate control or intervention group
Armit 2005	Less than 12 months follow-up
Armit 2009	Less than 12 months follow-up
Baker 2008	No appropriate control or intervention group
Baker 2008a	No appropriate control or intervention group
Baker 2011	Less than 12 months follow-up
Baruth 2010	More than 20% loss to follow-up
Baruth 2010a	No appropriate control or intervention group
Bennett 2008	Less than 12 months follow-up
Berlant 2004	No appropriate control or intervention group
Bowen 2006	No appropriate control or intervention group
Buman 2011	No appropriate control or intervention group
Calfas 2000	Face-to-face intervention only
Caperchione 2006	No appropriate control or intervention group
Carr 2012	Less than 12 months follow-up
Carroll 2010	Less than 12 months follow-up
Castro 2011	Remote and web 2.0 intervention only
Cheung 2008	Less than 12 months follow-up
Connell 2009	Insufficient data

Study	Reason for exclusion
Cox 2006	Study aim irrelevant
Cox 2008	Study aim irrelevant
Cox 2011	Study aim irrelevant
Cox 2011a	Study aim irrelevant
Crain 2010	Remote and web 2.0 intervention only
Cunningham 1987	Face-to-face intervention only
de Vreede 2007	Less than 12 months follow-up
Dorgo 2009	Less than 12 months follow-up
Dorgo 2011	Less than 12 months follow-up
Dubbert 2002	Less than 12 months follow-up
Duncan 2005	No appropriate control or intervention group
Duru 2010	Less than 12 months follow-up
Elley 2003	Remote and web 2.0 intervention only
Elley 2004	Remote and web 2.0 intervention only
Elley 2011	Remote and web 2.0 intervention only
Estabrooks 2011	Less than 12 months follow-up
Evers 2012	Less than 12 months follow-up
Farmandbar 2012	Insufficient data
Ferney 2009	Less than 12 months follow-up
Findorff 2007	Inappropriate primary outcome
Finni 2011	No appropriate control or intervention group
Fitzsimons 2008	No appropriate control or intervention group
Fitzsimons 2012	No appropriate control or intervention group
Fortier 2007	Less than 12 months follow-up
Fortier 2007a	Less than 12 months follow-up
Fortier 2011	Less than 12 months follow-up
Fortier 2011a	Less than 12 months follow-up
Freene 2011	No appropriate control or intervention group

Study	Reason for exclusion
French 2011	Less than 12 months follow-up
Froehlich-Grobe 2012	More than 10% of participants with a pre-existing medical condition
Fujita 2003	Less than 12 months follow-up
Fukuoka 2011	No appropriate control or intervention group
Gine-Garriga 2009	More than 10% of participants with a pre-existing medical condition
Godin 2010	Less than 12 months follow-up
Goldstein 1999	Less than 12 months follow-up
Grandes 2008	Face-to-face intervention only
Grandes 2009	Face-to-face intervention only
Grandes 2011	Face-to-face intervention only
Greaney 2008	Multiple risk factor intervention
Green 2002	Less than 12 months follow-up
Hardcastle 2012	Non-randomised study
Hardeman 2011	Remote and web 2.0 intervention only
Harland 1999	Face-to-face intervention only
Harrison 2005	More than 10% of participants with a pre-existing medical condition
Havenar 2007	More than 20% loss to follow-up
Herrera-Sanchez 2006	Multiple risk factor intervention
Hillsdon 2002	Face-to-face intervention only
Hind 2010	Less than 12 months follow-up
Hosper 2008	Non-randomised study
Hovell 2008	Multiple risk factor intervention
Hughes 2009	Less than 12 months follow-up
Iliffe 2010	Face-to-face intervention only
Inoue 2003	Less than 12 months follow-up
Isaacs 2007	Less than 12 months follow-up
Jimmy 2005	Non-randomised study
Jolly 2009	Less than 12 months follow-up

Study	Reason for exclusion
Juneau 1987	Less than 12 months follow-up
Katz 2008	Face-to-face intervention only
Kerse 2005	Remote and web 2.0 intervention only
King 1988	Less than 12 months follow-up
King 2006	No appropriate control or intervention group
King 2007	Remote and web 2.0 intervention only
Kinmonth 2008	Remote and web 2.0 intervention only
Kolt 2007	Remote and web 2.0 intervention only
Kolt 2009	No appropriate control or intervention group
Kolt 2012	No appropriate control or intervention group
Kriska 1986	Face-to-face intervention only
Kriska 2012	Study aim irrelevant
Lamb 2002	No appropriate control or intervention group
Lawton 2008	Remote and web 2.0 intervention only
Lawton 2009	Remote and web 2.0 intervention only
LeCheminant 2011	Less than 12 months follow-up
Leung 2012	No appropriate control or intervention group
Lombard 1995	Less than 12 months follow-up
Macmillan 2011	Less than 12 months follow-up
Marcus 2007	No appropriate control or intervention group
Marcus 2007a	No appropriate control or intervention group
Marcus 2007b	Remote and web 2.0 intervention only
Marcus 2007c	Remote and web 2.0 intervention only
Marshall 2003	Less than 12 months follow-up
Marshall 2004	Less than 12 months follow-up
Martinson 2008	Remote and web 2.0 intervention only
Martinson 2010	Remote and web 2.0 intervention only
McAuley 2007	No appropriate control or intervention group

Study	Reason for exclusion
McAuley 2012	Remote and web 2.0 intervention only
McEachan 2011	No appropriate control or intervention group
McGowan 2009	Less than 12 months follow-up
McGowan 2009a	Less than 12 months follow-up
McMurdo 2010	Less than 12 months follow-up
Merom 2007	Less than 12 months follow-up
Muda 2006	Less than 12 months follow-up
Murphy 2010	More than 10% of participants with a pre-existing medical condition
Napolitano 2006	Remote and web 2.0 intervention only
Napolitano 2010	Remote and web 2.0 intervention only
Newton 2004	Less than 12 months follow-up
Nichols 2000	Less than 12 months follow-up
Nies 2006	No appropriate control or intervention group
Norris 2000	Less than 12 months follow-up
Norton 2011	Non-randomised study
Opdenacker 2008	More than 20% loss to follow-up
Opdenacker 2011	More than 20% loss to follow-up
Oppert 2007	Less than 12 months follow-up
Paasche-Orlow 2012	No appropriate control or intervention group
Papandonatos 2012	Remote and web 2.0 intervention only
Peels 2012	Remote and web 2.0 intervention only
Pekmezi 2009	Less than 12 months follow-up
Pekmezi 2010	No appropriate control or intervention group
Petrella 2003	No appropriate control or intervention group
Petrella 2006	More than 20% loss to follow-up
Petrella 2010	No appropriate control or intervention group
Pinto 2002	Less than 12 months follow-up
Pinto 2005	Less than 12 months follow-up

Study	Reason for exclusion
Plotnikoff 2007	More than 20% loss to follow-up
Plotnikoff 2010	More than 20% loss to follow-up
Poulsen 2007	More than 20% loss to follow-up
Prestwich 2012	Less than 12 months follow-up
Ransdell 2004	Less than 12 months follow-up
Reed 2008	Less than 12 months follow-up
Reid 1979	Less than 12 months follow-up
Resnick 2002	Less than 12 months follow-up
Rose 2007	Remote and web 2.0 intervention only
Sarkisian 2010	No appropriate control or intervention group
Schneider 2011	No appropriate control or intervention group
Sevick 2007	Remote and web 2.0 intervention only
Sheeran 2012	Less than 12 months follow-up
Sherwood 2008	Remote and web 2.0 intervention only
Simons-Morton 2001	No appropriate control or intervention group
Skar 2011	Less than 12 months follow-up
Slootmaker 2005	Less than 12 months follow-up
Smith 2000	Less than 12 months follow-up
Sorensen 2007	Less than 12 months follow-up
Sorensen 2008	Less than 12 months follow-up
Spittaels 2007	Less than 12 months follow-up
Spittaels 2007a	Less than 12 months follow-up
Steele 2007	Less than 12 months follow-up
Steele 2009	Less than 12 months follow-up
Stevens 1998	Less than 12 months follow-up
Stewart 2001	Face-to-face intervention only
Talbot 2010	Less than 12 months follow-up
Talbot 2011	Less than 12 months follow-up

Study	Reason for exclusion
Tan 2006	Less than 12 months follow-up
Taylor 2005	Less than 12 months follow-up
Thogersen-Ntoumani 2010	Less than 12 months follow-up
Thomas 2012	No appropriate control or intervention group
Vainionpää 2007	Study aim irrelevant
van Sluijs 2006	Less than 12 months follow-up
van Stralen 2008	Remote and web 2.0 intervention only
van Stralen 2009	Remote and web 2.0 intervention only
van Stralen 2009a	Remote and web 2.0 intervention only
van Stralen 2010	Remote and web 2.0 intervention only
van Stralen 2011	Remote and web 2.0 intervention only
Visek 2011	Less than 12 months follow-up
von Thiele 2008	Study aim irrelevant
Wadsworth 2010	Less than 12 months follow-up
Wanner 2009	No appropriate control or intervention group
Wanner 2010	No appropriate control or intervention group
Watkinson 2010	Less than 12 months follow-up
Whitehead 2007	Less than 12 months follow-up
Wilcox 2007	More than 20% loss to follow-up
Williams 2004	Remote and web 2.0 intervention only
Williams 2006	Remote and web 2.0 intervention only
Williams 2011	No appropriate control or intervention group
Wilson 2009	Less than 12 months follow-up
Wilson 2010	Face-to-face intervention only

Characteristics of studies awaiting classification *[ordered by study ID]*

[Heesch 2004](#)

Methods	Randomised trial
---------	------------------

Heesch 2004 (Continued)

Participants	244 sedentary adults
Interventions	Participants were part of either a group based intervention (PRIME G) or a telephone and mail based intervention (PRIME C)
Outcomes	Self-reported PA
Notes	Project PRIME long term results - chasing up the final outcome data

DATA AND ANALYSES
Comparison 1. Face-to-face versus remote intervention

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.1 Cardiorespiratory Fitness: 12 Months	1	225	Std. Mean Difference (IV, Random, 95% CI)	-0.02 [-0.30, 0.26]

Analysis 1.1. Comparison 1: Face-to-face versus remote intervention, Outcome 1: Cardiorespiratory Fitness: 12 Months

Study or Subgroup	Face-to-Face			Remote			Weight	Std. Mean Difference IV, Random, 95% CI	Std. Mean Difference IV, Random, 95% CI
	Mean	SD	Total	Mean	SD	Total			
King 1991	1.19	3.48	74	1.25	3.23	151	100.0%	-0.02 [-0.30, 0.26]	
Total (95% CI)			74			151	100.0%	-0.02 [-0.30, 0.26]	
Heterogeneity: Not applicable									
Test for overall effect: $Z = 0.13$ ($P = 0.90$)									
Test for subgroup differences: Not applicable

ADDITIONAL TABLES
Table 1. Examples of strategies used in typical face-to-face and remote and web 2.0 physical activity interventions

	Face-to-face intervention	Remote and web 2.0 intervention
Individual	1) Counselling session to assess self-efficacy and skills training to enhance options to be physically active	1) SMS prompts of local places to take physical activity based on personal preferences
	2) Personal training to improve fitness delivered directly by instructor in the gym	2) Computerised tailored feedback via e-mail that provide advice for current physical activity behaviour
	3) Health professionals distributing booklets to patients that describe the benefits of physical activity	3) Telephone reinforcement of public health recommendations for physical activity

Table 1. Examples of strategies used in typical face-to-face and remote and web 2.0 physical activity

Interventions Group	(Continued)	
	1) Exercise class to improve strength delivered directly by instructor in a community park	1) Online advice forums via an interactive website to plan physical activity
	2) Education sessions for physical activity opportunities at a community health centre	2) DVD distributed by post and played in a workplace to provide instruction on optimising physical activity
	3) Group bush walking session co-ordinated by a hike leader	3) Online networks for comparing physical activity behaviour to other people

Table 2. Search results for electronic databases

Database searched	Number of hits
CINAHL	4454
<i>The Cochrane Library</i>	6703
EMBASE	8930
MEDLINE Ovid	11431
PsycINFO Ovid	4156
Science Citation Index Expanded	6756
Total	42430
After de-duplication	27299

Table 3. Risk of bias and quality scores for included studies

Study	Allocation sequence generation	Allocation concealment	Incomplete outcome data	Selective outcome reporting	Comparable groups at baseline	Contamination between groups
King 1991	U	U	N	Y	Y	NA

Table 4. Risk of bias and quality scores for included studies

Study	Validated outcome measures	Applied appropriately	Final analysis adjusted for baseline physical activity levels	Outcome assessment independent and blinded	Intention-to-treat analysis
King 1991	Y	Y	Y	Y	N

Table 5. Quality of life outcomes

Study	Quality of Life Outcomes
King 1991	Not reported

Table 6. Cost effectiveness

Study	Cost effectiveness
King 1991	Not reported

Table 7. Adverse events

Study	Adverse events
King 1991	There were several sprains and fractures reported in this study, but there was no difference between the groups and none of the injuries caused any of the participants to withdraw from the study. No cardiac events were reported

Table 8. Who delivers intervention and follow-up, and individual or group approach

Study	Who delivered the primary dose of intervention?	Intervention individual or group based primary dose	Who delivered the follow-up dose of intervention?	Intervention individual or group based follow-up
King 1991	Project staff member	Individual	Group based training provided by community exercise instructors with physical education degrees. Project staff member made follow-up phone calls.	Individual and group

Table 9. Intensity of primary intervention and follow-up, and physical activity choice and supervision

Study	Primary dose intensity	Physical activity choice	Physical activity supervision	Follow-up frequency and dose
King 1991	The face-to-face intervention was delivered to a group by a supervising physical educator at a local community senior centre	Home based training programme choose their physical activity	Unsupervised	The face-to-face participants attended exercise classes at least three times per week for 12 months
	The remote intervention was home based and was delivered individually without direct supervision. The remote intervention comprised a high intensity PA and a low intensity PA group that were combined for data analysis	Group based attended local classes (3 x week)	Supervised	The remote participants only received four phone calls in first four weeks, then two calls in the next four weeks, followed by once a month for 12 months
	30-40 minutes duration			

APPENDICES

Appendix 1. Search strategies 2005

MEDLINE (Ovid)

```

1 exp Exertion/
2 Physical fitness/
3 exp "Physical education and training"/
4 exp Sports/
5 exp Dancing/
6 exp Exercise therapy/
7 (physical$ adj5 (fit$ or train$ or activ$ or endur$)).tw.
8 (exercis$ adj5 (train$ or physical$ or activ$)).tw.
9 sport$.tw.
10 walk$.tw.
11 bicycle$.tw.
12 (exercise$ adj aerobic$).tw.
13 (("lifestyle" or life-style) adj5 activ$).tw.
14 (("lifestyle" or life-style) adj5 physical$).tw.
15 or/1-14
16 Health education/
17 Patient education/
18 Primary prevention/
19 Health promotion/
20 Behaviour therapy
21 Cognitive therapy
22 Primary health care
23 Workplace/
24 promot$.tw.
25 educat$.tw.
26 program$.tw.
27 or/16-26
28 15 and 27

```

RCT filter ([Dickersin 1995](#))

EMBASE

```

1.((((health-education) or (health-education-research)) or ((patient-education) or (patient-education-and-counseling)) or ((health-promotion) or (health-promotion-international)) or (primary-health-care) or ((workplace) or (workplace-)) or (promot*) or ((promot*) or (educat*) or (program*) and (((exertion) or (fitness) or (fitness-) or ((fitness) or (fitness-)) or (exercise) or ((exercise) or (sport) or (walk*))))))
2.((research) or (((((random-controlled) or (random-sample) or (randomisation) or (randomised) or (randomised-controlled) or (randomization) or (randomization-) or (randomizd) or (randomize) or (randomized) or (randomized-block) or (randomized-controlled) or (randomized-controlled-trial) or (randomized-control)) or ((double-blind) or (double-blind-procedure)) or ((single-blind) or (single-blind-procedure))) and (ec=human)) or (clinical) or (clin*) or (trial*) or (((clin* near trial*) in ti) and (ec=human)) or (clin*) or (trial*) or (((clin* near trial*) in ab) and (ec=human)) or (sing*) or (doubl*) or (trebl*) or (tripl*) or (blind*) or (mask*) or (((sing* or doubl* or trebl* or tripl*) near (blind* or mask*)) and (ec=human)) or ((placebos) or (placebo-controlled)) or ((placebo* in ti) and (ec=human)) or ((placebo* in ab) and (ec=human)) or ((random* in ti) and (ec=human)) or ((random in ab) and (ec=human)) or (research)) ec=human)
3.((((studies) or (prospective-study) or (follow-up) or (comparative) or (evaluation)) and (ec=human))

```

CINAHL

```

1.exact{controlled}
2.exact{randomized}
3.exact{random-assignment}
4.exact{double-blind}
5.exact{single-blind}
6.#1 or #2 or #3 or #4 or #5
7.exact{animal}
8.exact{human}

```

9.#6 not #7
 10.exact{clinical}
 11.(clin* near trial*) in ti
 12.(clin* near trial*) in ab
 13.(singl* or doubl* or trebl* or tripl*) near (blind* or mask*)
 14.(#13 in ti) or (#13 in ab)
 15.placebos
 16.placebo* in ti
 17.placebo* in ab
 18.random* in ti
 19.random* in ab
 20.exact{research-methodology}
 21.#10 or #11 or #12 or #13 or #14 or #15 or #16 or #17
 22.#18 or #19 or #20
 23.#21 or #22
 24.animal
 25.human
 26.#23 not #24
 27.#26 or #9 or #8 or #25
 28.exact{comparative}
 29.study
 30.#28 and #29
 31.exact{evaluation}
 32.studies
 33.#31 and #32
 34.exact{follow-up}
 35.exact{prosecutive}
 36.#35 and #32
 37.control* or prosepctiv* or volunteer*
 38.(#37 in ti) or (#37 in ab)
 39.#38 or #36 or #33 or #30
 40.#39 not #24
 41.#39 or #27 or #9
 42.explode "exertion"/ all subheadings
 43."physical fitness"
 44.explode "physical education and training"/ all subheadings
 45.explode "sports"/ all subheadings
 46.explode "dancing"/ all subheadings
 47.explode "exercise therapy"/ all subheadings
 48.(physical\$ adj5 (fit\$ or train\$ or activ\$ or endur\$)).tw.
 49.(exercis\$ adj5 (train\$ or physical\$ or activ\$)).tw.
 50.sport\$.tw.
 51.walk\$.tw.
 52.bicycle\$.tw
 53.(exercise\$ adj aerobic\$).tw.
 54.(("lifestyle" or life-style) adj5 activ\$).tw.
 55.(("lifestyle" or life-style) adj5 physical\$).tw.
 56.#42 or #43 or #44 or #45 or #46 or #47 or #48 or #49 or (exercise\$) or (aerobic\$) or ("lifestyle") or (activ\$) or ("lifestyle") or (life-style) or (physical\$)
 57.health education
 58.patient education
 59.primary prevention
 60.health promotion
 61.behaviour therapy
 62.cognitive therapy
 63.primary health care
 64.workplace
 65.promot\$.tw.
 66.educat\$.tw.
 67.program\$.tw.
 68.#57 or #58 or #59 or #60 or #61 or #62 or #63 or #64 or #65 or #66 or #67
 69.#68 and #56

70.#69 and #41

PsycLIT

- 1.exertion
- 2.physical-fitness
- 3.exercise
- 4.explode exercise
- 5.sport
- 6.walk*
- 7.cycle
- 8.#1 or #2 or #3 or #4 or #5 or #6 or #7
- 9.health education
- 10.patient education
- 11.primary prevention
- 12.health promotion
- 13.behaviour therapy
- 14.cognitive therapy
- 15.primary health care
- 16.workplace
- 17.promot\$.tw.
- 18.educat\$.tw.
- 19.program\$.tw.
- 20.#9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19
- 21.#8 and #20
- 22.controlle
- 23.randomized
- 24.random-assignment
- 25.double-blind
- 26.single-blind
- 27.#22 or #23 or #24 or #25 or #26
- 28.animal
- 29.human
- 30.#27 not #28
- 31.clinical
- 32.(clin* near trial*) in ti
- 33.clin* near trial*) in ab
- 34.(singl* or doubl* or trebl* or tripl*) near (blind* or mask*)
- 35.(#34 in ti) or (#34 in ab)
- 36.placebos
- 37.placebo* in ti
- 38.placebo* in ab
- 39.random* in ti
- 40.random* in ab
- 41.research-methodology}
- 42.#31 or #32 or #33 or #34 or #35 or #36 or #37 or #38
- 43.#39 or #40 or #41
- 44.#42 or #43
- 45.animal
- 46.human
- 47.#44 not #45
- 48.#47 or #30 or #29 or #46
- 49.comparative
- 50.study
- 51.#49 and #50
- 52.evaluation
- 53.studies
- 54.#52 and #53
- 55.follow-up
- 56.propsective
- 57.#56 and #53
- 58.control* or prosepctiv* or volunteer*

59.(#58 in ti) or (#58 in ab)
60.#59 or #57 or #54 or #51
61.#60 not #45
62.#60 or #48 or #30
63.#62 and #21

SPORTDISCUS

1.'physical activity'
2.exercise
3.fitness
4.sedentary
5.housebound
6.aerobics or circuits or swimming or aqua or jogging or running or cycling or fitness or yoga or walking or sport
7.patient education
8.primary prevention
9.health promotion
10.behaviour therapy
11.cognitive therapy
12.primary health care
13.workplace
14.controlled
15.randomized
16.random-assignment
17.double-blind
18.single-blind
19.clinical
20.placebos
21.comparative
22.evaluation
23.study

SIGLE

1.explode "Exertion"/ all subheadings
2."Physical fitness"
3.explode "Physical education and training"/ all subheadings
4.explode "Sports"/ all subheadings
5.explode "Dancing"/ all subheadings
6.explode "Exercise therapy"/ all subheadings
7.(physical\$ adj5 (fit\$ or train\$ or activ\$ or endur\$)).tw.
8.(exercis\$ adj5 (train\$ or physical\$ or activ\$)).tw.
9.sport\$.tw.
10.walk\$.tw.
11.bicycle\$.tw
12.(exercise\$ adj aerobic\$).tw.
13.(("lifestyle" or life-style) adj5 activ\$).tw.
14.(("lifestyle" or life-style) adj5 physical\$).tw.
15.#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or (exercise\$) or (aerobic\$) or ("lifestyle") or (activ\$) or ("lifestyle") or (life-style) or (physical\$)
16.Health Education
17.Patient education
18.Primary prevention
19.Health promotion
20.Behaviour therapy
21.Cognitive therapy
22.Primary health care
23.Workplace
24.promot\$.tw.
25.educat\$.tw.
26.program\$.tw.
27.#16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26
28.#15 and #27

SCISEARCH

- 1.((promot\$ or uptake or encourag\$ or increas\$ or start) near (physical adj activity))
- 2.(promot\$ or uptake or encourag\$ or increas\$ or start) near exercise
- 3.(promot\$ or uptake or encourag\$ or increas\$ or start) near (aerobics or circuits or swimming or aqua\$)
- 4.(promot\$ or uptake or encourag\$ or increas\$ or start) near (jogging or running or cycling)
- 5.(promot\$ or uptake or encourag\$ or increas\$ or start) near ((keep adj fit) or (fitness adj class\$) or yoga)
- 6.(promot\$ or uptake or encourag\$ or increas\$ or start) near walking
- 7.(promot\$ or uptake or encourag\$ or increas\$ or start) near sport\$

Appendix 2. Search strategies 2012

CENTRAL

- #1MeSH descriptor: [Physical Fitness] this term only
- #2MeSH descriptor: [Physical Exertion] this term only
- #3MeSH descriptor: [Physical Education and Training] explode all trees
- #4MeSH descriptor: [Sports] explode all trees
- #5MeSH descriptor: [Dancing] this term only
- #6MeSH descriptor: [Exercise Therapy] explode all trees
- #7physical* near activ*
- #8physical* near train*
- #9physical* near fit*
- #10exercise* near train*
- #11exercise* near activ*
- #12exercise* near physical*
- #13sport*
- #14walk*
- #15bicycle*
- #16exercise* near aerobic*
- #17((life next style*) near activ*)
- #18life-style* near activ*
- #19lifestyle* near activ*
- #20((life next style*) near physical*)
- #21life-style* near physical*
- #22lifestyle* near physical*
- #23#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11
- #24#12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22
- #25#23 or #24
- #26MeSH descriptor: [Health Education] this term only
- #27MeSH descriptor: [Patient Education as Topic] this term only
- #28MeSH descriptor: [Primary Prevention] this term only
- #29MeSH descriptor: [Health Promotion] explode all trees
- #30MeSH descriptor: [Behavior Therapy] this term only
- #31MeSH descriptor: [Cognitive Therapy] this term only
- #32MeSH descriptor: [Primary Health Care] this term only
- #33MeSH descriptor: [Workplace] this term only
- #34promot*
- #35educat*
- #36program*
- #37#26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36
- #38#25 and #37

MEDLINE Ovid

1. Physical Exertion/
2. Physical Fitness/
3. exp "Physical Education and Training"/
4. exp Sports/
5. Dancing/
6. exp Exercise Therapy/
7. exp Exercise/
8. (physical\$ adj5 (fit\$ or train\$ or activ\$ or endur\$ or exertion\$)).tw.
9. (exercis\$ adj5 (train\$ or physical\$ or activ\$)).tw.

10. sport\$.tw.
11. walk\$.tw.
12. bicycle\$.tw.
13. ((exercise\$ adj3 aerobic\$) or aerobics).tw.
14. ((lifestyle or life-style) adj5 activ\$).tw.
15. ((lifestyle or life-style) adj5 physical\$).tw.
16. or/1-15
17. Health Education/
18. Patient Education as Topic/
19. Primary Prevention/
20. exp Health Promotion/
21. Behavior Therapy/
22. Cognitive Therapy/
23. Primary Health Care/
24. Workplace/
25. promot\$.tw.
26. educat\$.tw.
27. program\$.tw.
28. or/17-27
29. 16 and 28
30. randomized controlled trial.pt.
31. controlled clinical trial.pt.
32. randomized.ab.
33. placebo.ab.
34. drug therapy.fs.
35. randomly.ab.
36. trial.ab.
37. groups.ab.
38. 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37
39. exp animals/ not humans.sh.
40. 38 not 39
41. 29 and 40
42. (200412\$ or 2005\$ or 2006\$ or 2007\$ or 2008\$ or 2009\$ or 2010\$ or 2011\$ or 2012\$).ed.
43. 41 and 42

EMBASE Ovid

1. exp exercise/
2. fitness/
3. physical education/
4. exp sport/
5. dancing/
6. exp kinesiotherapy/
7. (physical* adj5 (fit* or train* or activ* or endure* or exert*)).tw.
8. (exercis* adj5 (train* or physical* or activ*)).tw.
9. sport*.tw.
10. walk*.tw.
11. ((exercise* adj aerobic*) or aerobic*).tw.
12. ((lifestyle or life-style) adj5 activ*).tw.
13. bicycle*.tw.
14. ((lifestyle or life-style) adj5 physical*).tw.
15. or/1-14
16. health education/
17. patient education/
18. primary prevention/
19. health promotion/
20. behavior therapy/
21. cognitive therapy/
22. primary health care/
23. workplace/
24. promot*.tw.
25. educat*.tw.

26. program\$.tw.
 27. or/16-26
 28. 15 and 27
 29. random\$.tw.
 30. factorial\$.tw.
 31. crossover\$.tw.
 32. cross over\$.tw.
 33. cross-over\$.tw.
 34. placebo\$.tw.
 35. (doubl\$ adj blind\$).tw.
 36. (singl\$ adj blind\$).tw.
 37. assign\$.tw.
 38. allocat\$.tw.
 39. volunteer\$.tw.
 40. crossover procedure/
 41. double blind procedure/
 42. randomized controlled trial/
 43. single blind procedure/
 44. 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43
 45. (animal/ or nonhuman/) not human/
 46. 44 not 45
 47. 28 and 46
 48. (200412* or 2005* or 2006* or 2007* or 2008* or 2009* or 2010* or 2011* or 2012*).dd.
 49. 47 and 48
 50. limit 49 to embase

CINAHL Plus with Full Text EBSCO

S34 S33 Limiters - Exclude MEDLINE records
 S33 S31 and S32
 S32 EM 20041201-20121010
 S31 S20 and S30
 S30 S21 or S22 or S23 or S24 or S25 or S26 or S27 or S28 or S29
 S29 TX allocat*
 S28 TX control*
 S27 TX assign*
 S26 TX placebo*
 S25 (MH "Placebos")
 S24 TX random*
 S23 TX (clinic* N1 trial?)
 S22 PT clinical trial
 S21 (MH "Clinical Trials+")
 S20 S10 and S19
 S19 S11 or S12 or S13 or S14 or S15 or S16 or S17 or S18
 S18 (TI promot* or educat* or program*) or (AB promot* or educat* or program*)
 S17 (MH "Work Environment")
 S16 (MH "Primary Health Care")
 S15 (MH "Behavior Therapy+")
 S14 (MH "Health Promotion")
 S13 (MH "Preventive Health Care")
 S12 (MH "Patient Education")
 S11 (MH "Health Education")
 S10 S1 or S2 or S3 or S4 or S5 or S6 or S7 or S8 or S9
 S9 (TI sport* or walk* or bicycle* or exercis* or aerobic*) or (AB sport* or walk* or bicycle* or exercis* or aerobic*)
 S8 (TI physical N5 (fit* or train* or activ* or endur* or exert*)) or (AB physcial* N5 (fit* or train* or activ* or endur* or exert*))
 S7 (TI exercis* N5 (train* or physical* or activ*)) or (AB exercis* N5 (train* or physical* or activ*))
 S6 (MH "Exercise+") or (MH "Therapeutic Exercise+")
 S5 (TI (lifestyle* or life-style*) N5 (activ* or physical*)) or (AB (lifestyle* or life-style*) N5 (activ* or physical*))
 S4 (MH "Sports+") or (MH "Dancing+")
 S3 (MH "Physical Education and Training")
 S2 (MH "Physical Fitness")
 S1 (MH "Exertion")

PsycINFO

1. exp exercise/
2. physical fitness/
3. physical activity/
4. exp sports/
5. physical education/
6. (physical\$ adj5 (fit\$ or train\$ or activ\$ or endur\$ or exertion\$)).tw.
7. (exercis\$ adj5 (train\$ or physical\$ or activ\$)).tw.
8. sport\$.tw.
9. walk\$.tw.
10. bicycle\$.tw.
11. ((exercise\$ adj3 aerobic\$) or aerobics).tw.
12. ((lifestyle or life-style) adj5 activ\$).tw.
13. ((lifestyle or life-style) adj5 physical\$).tw.
14. or/1-13
15. health education/
16. client education/
17. health promotion/
18. prevention/
19. primary health care/
20. behavior therapy/
21. cognitive therapy/
22. cognitive behavior therapy/
23. workplace*.tw.
24. promot\$.tw.
25. educat\$.tw.
26. program\$.tw.
27. or/15-26
28. 14 and 27
29. random*.tw.
30. trial.ab.
31. groups.ab.
32. factorial\$.tw.
33. crossover\$.tw.
34. cross over\$.tw.
35. cross-over\$.tw.
36. placebo\$.tw.
37. assign\$.tw.
38. allocat\$.tw.
39. volunteer\$.tw.
40. clinical trials/
41. (doubl\$ adj blind\$).tw.
42. (singl\$ adj blind\$).tw.
43. or/29-42
44. 28 and 43
45. (200412* or 2005* or 2006* or 2007* or 2008* or 2009* or 2010* or 2011* or 2012*).up.
46. 44 and 45

Web of Science

- # 20 #19 AND #18
19 TS=(random* or blind* or allocat* or assign* or trial* or placebo* or crossover* or cross-over*)
18 #17 AND #8
17 #16 OR #15 OR #14 OR #13 OR #12 OR #11 OR #10 OR #9
16 TI=(promot* or educat* or program*)
15 TS=(workplace)
14 TS=(primary health care)
13 TS=(cognitive therap*)
12 TS=((behaviour or behavior) NEAR/2 therap*)
11 TS=(health NEAR/2 promot*)
10 TS=(primary prevent*)
9 TS=((health educat*) or (patient* educat*))

Face-to-face versus remote and web 2.0 interventions for promoting physical activity (Review)

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```
# 8 #7 OR #6 OR #5 OR #4 OR #3 OR #2 OR #1
# 7 TS=((lifestyle* or life-style*) NEAR/5 (activ* or physical*))
# 6 TS=((exercis* NEAR/2 aerobic*) or aerobic*)
# 5 TS=(sport* or danc* or walk* or bicycle*)
# 4 TS=(physical* educat*)
# 3 TS=(exercis* NEAR/5 (train* or physical* or activ*))
# 2 TS=(physical NEAR/5 (fit* or train* or activ* or endur* or exert*))
# 1 TS=(exercis* therap*)
```

WHAT'S NEW

Date	Event	Description
15 June 2021	Review declared as stable	The editorial team considers the impact of this review as low and therefore this review is not planned to be updated.

HISTORY

Protocol first published: Issue 2, 2013

Review first published: Issue 9, 2013

CONTRIBUTIONS OF AUTHORS

All named authors contributed to the conceptual planning of this suite of reviews to update the previously completed Cochrane review assessing 'Interventions for promoting physical activity' ([Foster 2005a](#)). This manuscript was initially drafted by Justin Richards and Charlie Foster. Editorial contributions were received from Margaret Thorogood and Melvyn Hillsdon.

DECLARATIONS OF INTEREST

Melvyn Hillsdon has received a research council grant to investigate the feasibility of a primary care PA intervention. This was not a study of outcomes and therefore had no bearing on this review. He has been a member of a NICE programme development group on walking and cycling and was paid for travel expenses.

SOURCES OF SUPPORT

Internal sources

- British Heart Foundation Core Grant (021/P&C/Core/2010/HPRG), UK

External sources

- NIHR Cochrane Incentive Scheme 2012, UK

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

Study selection

The six month follow-up period was extended to 12 months in response to the recommendations from the previous versions of this review, which called for better study quality with longer follow-up periods ([Foster 2005a](#)).

Data extraction

The identified authors undertaking this task were modified.

Assessing the risk of bias

The identified authors undertaking this task were modified and the criteria for completing the task were explicitly identified.

Unit of analysis

The method for dealing with multiple intervention arms in a study was changed, and these were not compared to a split group. Instead, the relevant intervention arms were combined for comparison against an existing group from the other arms of the study using established approaches ([Higgins 2011](#)).

Subgroup analysis

There were insufficient data to perform any of the planned subgroup analyses. The comparison of group versus individual versus mixed (group and individual) became a secondary objective and was also not completed due to insufficient data.

Sensitivity analysis

The threshold for 'low' risk was specified as meeting at least 50% of the applicable risk of bias criteria.

INDEX TERMS

Medical Subject Headings (MeSH)

*Exercise; Health Promotion [*methods]; *Motor Activity; Randomized Controlled Trials as Topic; *Telephone

MeSH check words

Female; Humans; Male; Middle Aged