Effectiveness of physical activity promotion based in primary care: systematic review and meta-analysis of randomised controlled trials

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CRD summary
The authors concluded that promotion of physical activity to sedentary adults recruited in primary care significantly increased physical activity levels at 12 months as measured by self report. There was insufficient evidence to recommend exercise referral schemes over advice or counselling interventions. The authors' conclusion, backed by a discussion of methodological weaknesses in the included studies, seems justified.

Authors' objectives
To evaluate the effectiveness of physical activity promotion for sedentary adults in primary care.

Searching
MEDLINE, CINAHL, PsycINFO, EMBASE, SPORTDiscus, CRD databases and The Cochrane Library were searched without language restrictions to May 2010. Search terms were reported. Reference lists of relevant papers and reviews were handsearched and an independent expert was contacted to retrieve further studies.

Study selection
Eligible studies were randomised controlled trials (RCTs) that compared any physical activity intervention with any comparator to increase activity and/or fitness levels in sedentary adults (16 years and over) recruited from primary care. Trials had to have a minimum of 12 months follow-up post randomisation and had to use intention-to-treat analysis. Multifactorial interventions were excluded.

The included trials were conducted in Europe (six in the United Kingdom), New Zealand, USA, Canada and Australia. Participants were mostly white/European, aged between 17 and 92 years and were considered representative of the general primary care population. Approximately half of the participants were female. Not all participants were completely sedentary at baseline. Interventions varied widely but most were conducted in primary care by health professionals and included written materials alongside two or more advice sessions on physical activity. Exercise referral programmes involved a leisure centre, a community walking programme and small group exercise sessions at an unspecified location. Two thirds of the trials specified a theoretical base for the intervention. Control/comparator groups received no intervention or brief interventions that comprised mailed information or one-to-one advice. Outcomes included self reported physical activity behaviour (using various measures, reported in the paper), effects on cardiorespiratory fitness and adverse events.

Titles and abstracts were screened by one reviewer. Two independent reviewers reviewed full papers for inclusion. Discrepancies were resolved by a third reviewer.

Assessment of study quality
Trial quality was assessed on sequence generation, allocation concealment, blinding, completeness of outcome data and selective outcome reporting. The risk of bias was classified as low, high or unclear.

Two reviewers independently assessed study quality.

Data extraction
Data were extracted by two independent reviewers to enable presentation of odds ratios (OR) for dichotomous data and mean differences (MD) for continuous data, together with 95% confidence intervals (CI). Authors were contacted for missing data and one provided unpublished data.

Methods of synthesis
Odds ratios and standardised mean differences (SMD) were pooled in random-effects meta-analyses, along with 95% CI. The main analysis considered all physical activity interventions; a secondary analysis included only exercise referral
programmes (patient referred externally from primary care). The $I^2$ statistic was used to assess statistical heterogeneity (25% represented low, 50% moderate and 75% high heterogeneity). The number needed to treat for one additional sedentary adult to meet recommended levels of physical activity at 12 months was calculated. Planned subgroup analyses were carried out to compare studies using different types of control (other intervention or no intervention). Sensitivity analyses explored the influence of reviewer decisions about outcome selection and design effects. Further analysis looked at changes in target levels of physical activity between baseline and follow-up. Publication bias was assessed using funnel plots.

Results of the review
Fifteen RCTs (8,745 participants) were included in the review. All except two RCTs were considered to be at high risk of bias in at least one assessment area. The main methodological weaknesses related to blinding and completeness of data.

Small to medium improvements in self reported physical activity at 12 months were found using dichotomous data (OR 1.42, 95% CI 1.17 to 1.73; 11 RCTs; $I^2=43\%$) and continuous data (SMD 0.25, 95% CI 0.11 to 0.38; nine RCTs; $I^2=70\%$). The number needed to treat was 12 (95% CI 7 to 33; nine RCTs). The pooled effect for improvements in cardiorespiratory fitness was not statistically significant (four RCTs). No statistically significant effect was found for exercise referral programmes (three RCTs for dichotomous data; two RCTs for continuous data). Adverse events were not increased as a result of physical activity promotion in five RCTs; one RCT found an 11% increase in falls and a 6% increase in injuries following the intervention.

In subgroup analyses, physical activity interventions were significantly more effective than no intervention in terms of self reported behaviour at 12 months (six RCTs) but there was no statistically significant effect when they were evaluated against other comparators (seven RCTs). Increases in those meeting recommended physical activity levels at 12 months were comparable between active study groups. Where the control group received no intervention, increases were smaller.

Funnel plots did not suggest evidence of publication bias.

Authors' conclusions
Promotion of physical activity to sedentary adults recruited in primary care significantly increased physical activity levels at 12 months as measured by self report. There was insufficient evidence to recommend exercise referral schemes over advice or counselling interventions.

CRD commentary
The review question was clear and inclusion criteria were potentially replicable. Several relevant data sources were searched and attempts were made to minimise language and publication biases. The review process was conducted largely with adequate attempts to minimise error and bias. Relevant quality assessment criteria were applied and the results of this were reported clearly. Study details were presented. The chosen methods of synthesis seemed justified. Methodological weaknesses in the included studies were discussed by the authors at length, leading to research recommendations which seemed wholly appropriate.

The authors' conclusion, backed by the discussion of methodological weaknesses, seems justified.

Implications of the review for practice and research
Practice: The authors stated that primary care commissioners should consider the findings of this review pending further trials of exercise referral schemes and other primary care interventions.

Research: The authors stated that future trials should employ objective measures of physical activity and fitness and include improved reporting of study methods, intervention components and participant characteristics. Longer term follow-up with complete data and better reporting of adverse events were warranted. Research on the relative effectiveness of brief physical activity interventions and further trials of exercise referral were particularly needed.

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