Systematic review of maintenance of behavior change following physical activity and dietary interventions
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CRD summary
The review reported that physical activity and dietary interventions often reported behaviour change maintenance at follow-up of at least three months after the end of the intervention. Intervention and methodological characteristics affected behaviour change maintenance. The authors concluded that maintenance was often achieved, but limitations of the review synthesis mean that this conclusion should be treated with caution.

Authors' objectives
To determine how frequently physical activity and dietary interventions achieved maintenance of behaviour change and determine what trial characteristics were associated with such maintenance.

Searching
PubMed, Web of Science, MEDLINE and PsycINFO were searched for articles published in English between January 2000 and August 2009. Brief search terms were reported; searches were restricted to studies of adults.

Study selection
Primary and secondary prevention randomised controlled trials (RCTs) that evaluated physical activity and/or dietary behaviour change interventions targeted at adults were eligible for inclusion. Studies needed to have behavioural outcomes reported at least three time points (pre-intervention, postintervention and at least three months after the end of the intervention) and report between-group differences at the end of intervention and follow-up or report data that allowed computation of this.

The included studies were conducted in North America, Western Europe and Australia. Studies involved healthy adults and those with chronic disease. The mean age was 21 to 77 years. Interventions lasted from one day to 12 months. They included a range of strategies that included counselling (psychologist, sports or lay health advisor), written and video material, group exercise/physiotherapy, individual tailored reports or GP (general practitioner) feedback and log books, pedometers, self-help manuals, online forum discussions/tailored emails and newsletters. The control group received one or more of mailed information, delayed intervention, assessment with or without feedback, other health advice and usual care.

Two reviewers independently assessed studies for inclusion from abstracts. Disagreements were resolved by a third reviewer.

Assessment of study quality
Study quality was rated on a scale of zero to 5. A point was allocated if the study: assessed randomisation; used a validated behavioural measurement; adequately considered behaviour at baseline; had less than 30% loss to follow-up; and had adequate handling of missing data.

The authors did not state how many reviewers performed the validity assessment.

Data extraction
Maintenance of behaviour change was defined as a statistically significant between-group difference in favour of the intervention group reported at the end of an intervention and at follow-up for at least one behavioural outcome. Completeness of maintenance was defined as behavioural outcomes with a statistically significant between-group difference in favour of the intervention group at the end of the intervention and at follow-up.

Where results were reported for more than one follow-up assessment, data from the longest follow-up were used. Where between-group significance was not reported, it was calculated where possible using an online t-test calculator.

The authors do not state how many reviewers performed data extraction. Two reviewers independently coded the
behaviour change strategies.

**Methods of synthesis**
No statistical analysis was conducted. Studies were categorised according to whether or not they showed a statistically significant maintenance of behaviour change and completeness of maintenance.

**Results of the review**
Twenty-nine trials (17,065 participants) were included in the review. Quality scores ranged from 1 to 4.

Twenty-one (72%) of the 29 trials reported significant between-group differences in one or more behaviour outcomes. Two further trials reported significant between-groups behaviour change at follow-up despite no significant difference at the end of the intervention.

**Physical activity (15 trials, 4,269 participants):** Nine studies (2,233 participants) reported maintenance of behaviour change and four studies (432 participants) reported complete maintenance.

**Diet (seven trials, 10,542 participants):** Six studies (9,926 participants) reported maintenance of behaviour change and five studies (9,194 participants) reported complete maintenance.

**Physical activity and diet (seven trials, 2,254 participants):** Six studies (2,146 participants) reported maintenance of behaviour change and two studies (984 participants) reported complete maintenance.

**Sensitivity analysis:** Three studies included more than one post-intervention follow-up. Outcomes for the shorter follow-up assessment resulted in the same interpretation as the longer follow-up outcome.

Characteristics of the study designs and participants that met a 10% or more difference in maintenance threshold were presented in the review.

**Authors' conclusions**
Maintenance of physical activity and dietary behaviour change, when reported, was often achieved.

**CRD commentary**
The aims of the review and inclusion criteria were clear. The search appeared comprehensive. Language and publication biases were possible. Study selection was performed in duplicate. It is not clear how many reviewers performed data extraction and validity assessment, which raised the possibility of error and bias at these stages.

No statistical synthesis of studies was performed, other than the authors' reliance on statistical significance to determine effect, which was determined not only by the size of the effect but also the size of the study. This could have been avoided by conducting a meta-analysis, and it is not clear why the authors chose not to do so. Study quality was assessed. The authors noted that degree of loss to follow-up was related to maintenance of behaviour change, but did not comment on this in the conclusions.

The interpretation of the review was limited by the simplistic approach to synthesis and the authors conclusions should be treated with caution.

**Implications of the review for practice and research**
**Practice:** The authors did not state any implications for practice.

**Research:** The authors made seven recommendations for research. Intervention trials should evaluate maintenance of behavioural outcomes. Further studies of determinants of behaviour change initiation and maintenance were required. Evaluation of interventions over 24 weeks duration was required. More detailed reporting of intervention content was needed. There was a need for more detailed reporting of maintenance outcomes, which should include magnitude and direction of between-group differences at the end of interventions and follow-up. Methods for handling missing data should be reported. The importance of follow-up assessments should be recognised by funders and peer-review bodies.

**Funding**
Bibliographic details

PubMedID
21299298

DOI
10.1037/a0021974

Original Paper URL
http://psycnet.apa.org/journals/hea/30/1/99/

Additional Data URL
http://supp.apa.org/psycarticles/supplemental/a0021974/a0021974_supp.html

Indexing Status
Subject indexing assigned by NLM

MeSH
Attitude to Health; Clinical Trials as Topic; Exercise; Female; Follow-Up Studies; Food Habits; Health Behavior; Humans; Male; Secondary Prevention

AccessionNumber
12011001529

Date bibliographic record published
08/06/2011

Date abstract record published
30/04/2012

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.