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Effect of pedometer-based physical activity interventions: a meta-analysis

Kang M, Marshall SJ, Barreira TV, Lee JO

CRD summary
The review concluded that pedometers had a moderate positive effect on physical activity of approximately 2,000 steps per day compared with comparator. There were greater effects in females and the intervention strategy of 10,000 steps/day as a goal. Given uncertain quality of the included studies and a lack of study detail, caution is required when interpreting the authors' conclusions.

Authors' objectives
To determine the effectiveness of interventions that used pedometers as a motivational tool and to explore the influence of subgroups such as age, sex, intervention length and intervention strategy.

Searching
PubMed, SPORTDiscus, Proquest and American Alliance for Health, Physical Education, Recreation and Dance National Convention and Exposure Database were searched between January 2000 and August 2007. Google Scholar search engine was used to look for further studies. Search terms were reported. Reference lists of retrieved articles were searched.

Study selection
Studies that evaluated participants of any age or sex who used pedometers daily as a motivational tool were eligible for inclusion. Studies had to last at least four weeks and provide pre- and post-intervention step count. Studies that sealed pedometers to prevent self-monitoring were excluded.

The included studies evaluated pedometers used for 10k strategy, individual goal, log and other strategies in predominantly adult female participants. Studies in children and elderly participants of both sexes were included.

The authors did not state how the papers were selected for the review.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
Data were extracted on pre- and post-intervention step counts and used to calculate effect size (ES) and 95% confidence intervals (CIs).

At least two authors performed data extraction. Disagreements were resolved through consensus.

Methods of synthesis
Pooled effect sizes and 95% CIs were calculated using a random-effects meta-analysis. Statistical heterogeneity was assessed using X^2 and I^2 statistics. If heterogeneity was detected, moderator analysis was conducted to assess the influence of age, sex, intervention length and strategy variables on the effect of the intervention. Publication bias was assessed by comparison of effect sizes of published and unpublished studies with overall effect size.

Results of the review
Thirty-two studies (n=2,570 non-unique participants) were included in the review. Sample sizes ranged from 10 to 652 participants. Length of follow-up ranged from less than eight weeks to over 15 weeks.

Pedometer interventions had moderate positive effects on physical activity compared to comparators (ES 0.68, 95% CI 0.55 to 0.81, I^2=77%; 32 studies). Moderator analysis indicated that pedometers had the greatest benefits in women (ES 0.80, 95% CI 0.64 to 0.97; 28 studies) and in studies that had a 10k goal (ES 0.84, 95% CI 0.43 to 1.24; five studies). Pedometers had fewest benefits in men (ES 0.30, 95% CI -0.18 to 0.79; three studies) and a combination of ages (ES 0.28, 95% CI -0.10 to 0.66; five studies).

Authors' conclusions
Use of pedometers had a moderate positive effect on physical activity that equated to an average increase of 2,000 steps per day compared with comparator. There were greater effects in females and with an intervention strategy of 10,000 steps/day as a goal.

CRD commentary
Inclusion criteria for the review were clearly defined and several relevant data sources were searched. Publication bias was assessed and not found to be present, which appeared rational given the large number of included studies. The authors reported that they used methods designed to reduce error and bias during data extraction but not during study selection. The authors did not report that quality assessment was undertaken and details of study types were not provided, which made judging the quality of the included studies difficult. Studies were combined using random-effects meta-analysis, which appeared appropriate.

Given the uncertain quality of the included studies and a lack of detail regarding study characteristics, caution is required when interpreting the authors' conclusions.

Implications of the review for practice and research
Practice: The authors stated that the evidence from the review could help in the design of optimal pedometer-based interventions that maximised physical activity.

Research: The authors stated that research should focus on the analysis of the health outcomes of

pedometer-based physical activity interventions that compared different moderators.

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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.