Accumulated versus continuous exercise for health benefit: a review of empirical studies  

Murphy M H, Blair S N, Murtagh E M

CRD summary
The authors concluded that, compared with a single continuous session of exercise, the same amount of accumulated exercise had similar benefits for cardiovascular fitness, but no firm conclusions could be drawn on other health outcomes. A lack of details on study quality and other methodological concerns in the review process suggest that the authors’ conclusions may not be reliable.

Authors’ objectives
To compare the effectiveness of a single continuous session of exercise with the same total amount of exercise accumulated over several sessions on a range of health outcomes.

Searching
MEDLINE was searched. Search terms were reported, but search dates were not. The authors’ personal bibliographical libraries were also screened. Only studies published in English language journals were considered.

Study selection
Studies which compared a single continuous session of exercise with two or more accumulated sessions of the same total amount of exercise, in participants with prescribed exercise duration, were eligible for inclusion. An additional intervention of weight loss programme had to be applied equally to both exercise conditions. Two types of study were eligible: training studies with at least one health outcome measured before and after interventions of at least four weeks' duration; and short-term studies with at least one health outcome measured during the 48 hours after interventions.

Included studies assessed a number of interventions: walking, running, jogging, treadmill exercise, and aerobic exercise. The majority of training studies had a total daily exercise duration of 20 to 40 minutes on three to five days per week. The accumulated exercise in included training studies was prescribed with two, three or four sessions of between 10 and 15 minutes. The total duration of exercise in included short-term studies ranged from 30 to 90 minutes. The majority of participants were middle-aged female and 22.4% of them were overweight.

Two reviewers independently assessed studies for inclusion, with any disagreements resolved by consensus.

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

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
The studies were combined in a narrative synthesis, supported by accompanying data tables.

Results of the review
Twenty-three studies (n=1,004 participants) were included in the review: sixteen long-term training studies (n=908 participants) and seven short-term studies (n=96 participants). The follow-up of long-term training studies ranged from four to 20 weeks.

Long-term training studies
Fitness: All except for two studies reported a significant improvement in at least one measure of cardiovascular fitness following the exercise interventions. Two studies showed greater improvement in cardiovascular fitness in the accumulated exercise group compared with the continuous exercise group.
Adiposity: Three studies reported no changes in percentage body fat in any exercise group. One study reported a decrease in percentage body fat in the continuous exercise group only. Two studies showed a non-significant difference in percentage body fat between the continuous and accumulated conditions of exercise.

Blood pressure: Two out of six studies showed no differences in both systolic and diastolic blood pressure between continuous and accumulated exercise interventions.

Results for the outcomes of waist and hip circumference, body mass, blood lipids and psychological outcomes were also reported.

**Short-term studies**

Fasting blood lipids: Five studies reported no differences in triglyceride or total cholesterol levels between accumulated and continuous exercise interventions.

Postprandial lipaemia: Three studies reported no differences in postprandial lipaemia between accumulated and continuous exercise interventions.

Results for the outcomes of fasting glucose and insulin were also reported.

**Authors’ conclusions**

Compared with a single continuous session of exercise, the same total amount of accumulated exercise had similar benefits on the outcome of cardiovascular fitness. There were no firm conclusions on the other health outcomes and the short-term effects of continuous and accumulated exercise.

**CRD commentary**

This review’s inclusion criteria were not specified for outcomes or the study design; it is unclear whether the review used the best research evidence to address the review question. The decision to restrict the review to published studies reported in English may have increased the chances of both publication and language biases. Steps were taken to minimise bias by having more than one reviewer independently undertake the study selection, but it was unclear whether the process of data extraction was also performed in duplicate. Adequate details of the primary studies were provided, but a formal validity assessment was not carried out.

The authors did not discuss the level of clinical heterogeneity between the included studies; it was difficult to assess whether the decision to adopt a narrative synthesis was appropriate. A lack of details on study quality and other methodological concerns in the review process suggest that the authors’ conclusions may not be reliable.

**Implications of the review for practice and research**

**Practice:** The authors stated that there was insufficient evidence to support splitting a continuous session of exercise into several shorter sessions of exercise interspersed throughout the day.

**Research:** The authors stated that further studies are required to evaluate the health benefits of shorter sessions of accumulated exercise (less than ten minutes). Further studies should assess whether the approach of accumulated exercise increases adherence to exercise programmes for the sedentary population.

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None.

**Bibliographic details**

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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.