Physical activity dose-response effects on outcomes of depression and anxiety

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Authors’ objectives
To examine the scientific evidence for a dose-response relationship between physical activity and depressive and anxiety disorders.

Searching
MEDLINE, PsycLIT and the Internet were searched (dates of searches were not reported); the keywords were reported in the paper. The reference lists of review articles, book chapters and relevant meta-analyses were checked for additional references. The authors also searched their personal files.

Study selection
Study designs of evaluations included in the review
The author did not specify any inclusion and exclusion criteria in terms of study design. The included study designs were cross-sectional epidemiologic studies, prospective epidemiologic studies, quasi-experimental studies and randomised controlled trials (RCTs).

Specific interventions included in the review
Studies that measured the effects of any type of physical activity (occupational or leisure-time) on anxiety and depression were eligible for inclusion. The majority of studies did not specify the type of physical activity.

Participants included in the review
Studies that included participants with symptoms of anxiety or depression according to the Diagnostic and Statistical Manual of Mental Disorders, 4th ed. (DSM-IV) were eligible. The following depression and anxiety disorders were specifically included: major depressive disorder; dysthymic disorder; depressive disorder not otherwise specified; panic disorder without agoraphobia; generalised anxiety disorder; and anxiety disorder not otherwise specified. Studies that measured depression secondary to other co-morbid conditions were excluded, as were studies of people with bipolar disorder, cyclothymia or substance-induced mood disorder.

Outcomes assessed in the review
Studies that measured the effects of physical activity on symptoms of anxiety and depression were eligible. Studies that only examined the acute effects of exercise were excluded. Studies that did not specify the methods used to measure the anxiety and depression outcomes were excluded.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

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
How were the studies combined?
The findings of the study were discussed in a narrative synthesis.
How were differences between studies investigated?
Differences between the studies were discussed within the text of the review.

**Results of the review**
A total of 37 studies were eligible for inclusion. Nineteen of the included studies were quasi-experimental studies or RCTs. Of the observational studies, 9 used a cross-sectional design and 9 used a prospective design.

Data from quasi-experimental studies and RCTs provided information about the intensity, duration and frequency of exercise prescription. These studies demonstrated that light-, moderate- and vigorous-intensity exercise may reduce symptoms of depression. There was less evidence for patients diagnosed with anxiety disorders. There was also evidence that both aerobic exercise and resistance training can reduce symptoms of depression and anxiety. The authors did not identify any studies that varied the frequency or duration, or controlled for, total energy expenditure.

Data from the observational studies provided information on the effect of varying amounts of leisure-time and occupational physical activity on the levels of depression and anxiety. These studies suggested that greater amounts of activity were generally associated with reduced symptoms of depression. Only 2 studies presented data on anxiety symptoms.

**Authors' conclusions**
There was little evidence for dose-response effects because of the lack of higher quality evidence.

**CRD commentary**
The methodology of this review was generally adequate. The authors posed a clear review question and the inclusion criteria were discernable from the text. A number of sources were searched for studies and the search terms (but not dates) were reported. However, details of the review process, such as the selection of studies and data extraction, were not reported. In addition, the authors failed to assess the quality of the included studies, other than ranking them by level of evidence. Given that studies of different designs were included in the review, a validity assessment would be particularly important. Details of the studies were well presented in tabular format and the authors summarised the data from the included studies clearly. However, the authors made no attempt to pool the data from the included RCTs. Despite the methodological limitations outlined, the authors' conclusions follow from the data presented.

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

Research: The authors stated that future studies should follow established criteria in terms of adequately diagnosing patients and using outcome measures with appropriately defined treatment standards. They also stated that future studies should carefully document the exercise dose and examine the relation of treatment outcomes with cardiorespiratory and/or muscular fitness. In addition, the authors provide a 5-point list of issues that should be resolved in future studies.

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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.