Exercise interventions as an adjunct therapy for psychosis: a critical review
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CRD summary
This review assessed the effectiveness of adjunct exercise therapy for psychosis. The authors concluded that the findings suggest a positive benefit of exercise on the mental health of people with psychosis, but that further research is required to draw firm conclusions. Given the methodological limitations of the included studies and variation between them, the authors’ cautious conclusions are appropriate.

Authors’ objectives
To assess the effectiveness of adjunct exercise therapy for psychosis on psychological outcomes.

Searching
PubMed, PsycINFO, the Cochrane Library, CINAHL, SPORTDiscus and Scopus were searched in August 2005; the search terms were reported. The search was restricted to English language papers published in peer-reviewed journals. References of reviews and articles were handsearched.

Study selection
Study designs of evaluations included in the review
There were no inclusion criteria for study design. The studies included were quantitative, qualitative, or used mixed methods and reported both qualitative and quantitative outcomes. The study designs included were randomised controlled trials (RCTs), quasi-experimental, ethnographic and case studies; the design of some of the mixed methods studies was unclear.

Specific interventions included in the review
Studies of physical exercise interventions were eligible for inclusion. Studies that included other formal non-pharmalogical interventions were excluded. The interventions included in the review were aerobic exercise (including running, swimming, walking, treadmill, bicycle ergometer), non-aerobic exercise, judo and weights training. All exercise interventions were structured, supervised sessions. Exercise sessions lasted 5 to 50 minutes and ranged in frequency from once weekly to five times weekly. The duration of the interventions ranged from 4 to 16 weeks.

Participants included in the review
Studies of adults aged 16 years or older with a diagnosis of psychosis were eligible for inclusion. Psychosis was defined as schizophrenia, schizoaffective disorder, schizophreniform, bipolar disorder and depression with psychotic features for the purpose of the study. The participants included in the review had a diagnosis of schizophrenia, bipolar disorder, other psychoses, neurotic anxiety, reactive depression and affective disorder. The participants were aged from 18 to 63 years and the majority were male. Both in- and out-patient populations were included. The majority of the participants were in-patients.

Outcomes assessed in the review
Studies measuring at least one psychological outcome were eligible for inclusion. The outcomes reported were anxiety, depression, self-esteem and body consciousness. A wide range of outcome measures were used. Only the Beck Depression Inventory was used in more than one study. Qualitative outcomes were assessed using structured and semi-structured interviews, observations and nursing notes.

How were decisions on the relevance of primary studies made?
Three authors independently reviewed articles.

Assessment of study quality
A formal validity measure or checklist was not used, owing to the heterogeneity of study designs included in the review. Aspects of study quality were critically reported within the text. The authors did not state how many reviewers assessed study quality.
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. For each study the main findings of both qualitative and quantitative data were extracted, with p-values where findings were statistically significant.

Methods of synthesis
How were the studies combined?
The studies were grouped according to study design and type of outcome (quantitative, qualitative, or both) and reported in a table. The findings were briefly discussed in a narrative synthesis.

How were differences between studies investigated?
Differences between the studies were discussed in the text and tables.

Results of the review
Ten studies (n=68) were included. Four were quantitative only (one RCT, two quasi-experimental studies and one case study; n=26), two were qualitative only (one ethnographic design, one case study; n=3) and four reported both qualitative and quantitative outcomes (number of participants unclear, between 29 and 39).

Quantitative measures.
Due to small sample sizes, many studies lacked the power to show statistically significant changes in outcomes. Significant improvement was shown in body consciousness in one quasi-experimental study with an intervention of 20 minutes of exercise focusing on specific body parts and 10 minutes of relaxation focusing on body parts (p<0.05). In a mixed methods study a significant change was shown in Becks Depression Inventory scores at 3, 6, 9 and 12 weeks for participants undergoing aerobic exercise, but not for participants undergoing non-aerobic exercise (p<0.05). One case study showed deterioration in mental well-being, as measured by the Brief Psychological Rating Scale.

Qualitative measures.
Small sample sizes and a wide range of dimensions measured limited the ability to draw overall conclusions. However, positive changes were reported in studies along dimensions of social interaction (three studies), family relationships (one study), hygiene (one study), sleeping patterns (one study), energy (three studies), psychological well-being (three studies), aggression control (two studies), and coping strategies (two studies). A reduction in anxiety was reported in the four mixed methodology studies. Participants also reported an increase in energy (three studies) and motivation (one study).

Authors' conclusions
The findings suggest that exercise may have a positive effect on the mental health of people with a diagnosis of psychosis. However, further research is required in order to draw firm conclusions.

CRD commentary
Inclusion criteria for the intervention, participants and outcomes were clearly defined, whereas those for study design do not appear to have been stated a priori and a wide range of study designs were included. A number of sources were searched, but the restriction to articles published in English in peer-reviewed journals means that important studies might have been missed and publication bias introduced. Appropriate steps were taken to minimise bias when selecting the studies. However, such information was not available for the quality assessment and data extraction processes, therefore error or bias in these areas cannot be ruled out. A critical review of the included studies highlighted aspects of methodological weakness: varying drug dosages, the inclusion of patients with a diagnosis other than psychosis, possible bias in the selection process, and exposure to other psycho-educational programmes.

There was a high level of clinical and methodological heterogeneity amongst the included studies and sample sizes were low. The decision to use a narrative synthesis was appropriate. Given the heterogeneity and methodological weaknesses of the included studies, the authors' cautious conclusions are appropriate.
Implications of the review for practice and research
Practice: Regular exercise may be useful as an adjunct therapy, however, further research is needed.

Research: Further quantitative and qualitative research is needed, including the use of psychosis-specific measures. There is also a need for more large-scale RCTs and experimental research in this area. Further research into the cost-effectiveness of exercise interventions is required.

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