Functional rehabilitation interventions for chronic ankle instability: a systematic review
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CRD summary
This review concluded that functional rehabilitation in patients with chronic ankle instability showed improvements in measures of dynamic postural control and self-reported outcomes, but further research was needed. Methodological limitations in the review and the small number of relatively poor-quality studies meant that the conclusion on effectiveness of functional rehabilitation should be viewed with caution.

Authors' objectives
To assess the effectiveness of functional rehabilitation for both postural control and self-reported outcomes in chronic ankle instability.

Searching
MEDLINE, PubMed and SPORTDiscus were searched from 1988 to December 2008 for English-language publications. Search terms were reported.

Study selection
Studies of at least one functional rehabilitation intervention (dynamic closed-kinetic-chain activity other than quiet standing) that reported at least one outcome measure of functional performance were eligible for inclusion. Studies were required to include at least one group of participants with previous ankle injury who reported either repeated lateral ankle sprains or episodes of "giving way".

Each included study assessed a different functional rehabilitation intervention; two studies used an intervention that included a wobble board or similar tool and two studies included jump-landing training. A range of outcome measures was reported: two studies used Star Excursion Balance Test to assess dynamic postural control; two studies recorded self-reported number of ankle sprains in the following season; and two studies used Foot and Ankle Disability Index (FADI) to assess self-reported levels of ankle function. All other outcome measures were reported by single studies only.

The authors did not state how many reviewers assessed studies for inclusion.

Assessment of study quality
Two reviewers rated study quality using the PEDro (Centre for Evidence-based Physiotherapy) scoring system (maximum score 10) to assess internal validity and whether a trial contained sufficient statistical information to make it interpretable; there were no disagreements between reviewers.

Data extraction
Effect sizes with 95% confidence intervals (CIs) were extracted or calculated for each included study using the Cohen formula. The effect size scale (0.2=small, 0.5=moderate, 0.8=large) was used.

Relative risks (RR) with 95% CIs were calculated for studies that reported the number of sprains after rehabilitation intervention.

The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
Studies were combined in a narrative synthesis grouped by outcome type (dynamic postural control measures and self-reported outcomes). Results of individual studies were illustrated in forest plots.

Results of the review
Six studies (number of participants not reported) were included in the review. No details of study designs were
reported. PEDro scores ranged from one to six.

**Postural control measures:** Four studies reported eight different outcomes. Only two outcomes were reported by more than one study. Effect sizes varied substantially across outcome measures and ranged from small to large (0.38 to 1.18). Three assessments from two studies (two used Biodex balance system and one used mediolateral time to stabilisation) showed no significant effect for functional training; one study that used Star Exercise Balance Test showed a negative effect.

**Self-reported outcomes:** Three studies provided five data sets for effect sizes based on self-reported outcome measures. Two studies reported significant improvements in ankle function using the FADI and FADI-sport score (one study) and Ankle Joint and Foot Assessment Tool (AJFAT); effect sizes were high (0.77 to 2.66). The third study also used the FADI and FADI-sport score and showed no significant effect for functional training. It should be noted that the text of the results section suggested that all three studies reported significant effects.

**Risk of sprain subsequent to functional training:** One study reported a reduction in risk for proprioceptive training compared with control (RR 0.13, 95% CI 0.003 to 0.93), but no significant effect for strength training. A second study did not include a control group, but compared an ankle brace group with proprioceptive- and technical landing-training groups; the authors used the brace group as a control and calculated relative risks of 0.31 for technical training and 0.18 for proprioceptive training.

**Authors' conclusions**
The reviewed studies were associated with improved ankle stability for both postural control and self-reported function. More studies may be needed with more consistent effect sizes and confidence intervals to make a definitive conclusion.

**CRD commentary**
The review addressed a clearly stated research question and provided a list of inclusion criteria. Searches were limited to two bibliographic databases and restricted to studies published in English, which raised the possibility of language and publication biases; relevant studies may have been omitted from the review. It appeared that measures were taken to minimise error and/or bias during the quality assessment process; it was unclear whether similar measures were applied throughout the review. Use of a narrative synthesis was appropriate given the range of interventions and outcome assessment tools reported. However, reporting of results could have been clearer; effect sizes for individual studies and outcome measures were not reported and in places the text appeared to contradict the results shown in forest plots.

Overall, the authors' conclusions on the effectiveness of functional rehabilitation should be viewed with caution, given the limitations of the review and the small number of relatively poor-quality studies. The conclusion that further research was required was appropriate.

**Implications of the review for practice and research**
**Practice:** The authors stated that clinicians can implement dynamic closed-chain rehabilitation exercises for four to six weeks, three or four times a week, with confidence. They further stated that use of wobble boards in functional rehabilitation interventions was supported by the literature.

**Research:** The authors recommended further research on functional ankle rehabilitation that used consistent definitions of chronic ankle instability, fully described interventions and reported effect sizes with 95% CIs. More prospective studies on injury prevention were recommended.

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**Bibliographic details**
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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.