Treatment of accommodative and nonstrabismic binocular dysfunctions: a systematic review
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CRD summary
The review found evidence that vision therapy was effective for treatment of convergence insufficiency, but that pencil push-up and base-in prism therapy were not effective. There was insufficient evidence to support specific therapeutic options for other non-strabismic binocular anomalies or accommodative disorders. In view of the suboptimal search and small amount of randomised data, the authors’ conclusions require cautious interpretation.

Authors' objectives
To evaluate the efficacy of non-surgical treatments for visual accommodative and non-strabismic binocular anomalies.

Searching
FRANCIS, MEDLINE, CINAHL and PsycINFO were searched from 1986 to July 2007. Search terms were reported. The search was restricted to published articles in English.

Study selection
Studies of non-surgical treatment of accommodative anomalies and non-strabismic binocular dysfunctions in children or adults were eligible for inclusion.

Participants in the included studies were children and adults (age range five to 73 years, where reported) with accommodative insufficiency, convergence insufficiency, accommodative anomaly, exodeviation, esodeviation or divergence excess; in most studies patients had convergence insufficiency. Interventions included vision therapy, pencil push-up therapy, base-in prism, refractive correction and plus lenses; they were delivered in a home and/or office setting (where reported). Few studies measured outcomes with validated symptom questionnaires. Duration of treatment ranged from one month to 4.7 years, where reported.

The authors did not state how many reviewers performed the selection.

Assessment of study quality
The quality of study design was assessed. Randomised, blinded and placebo-controlled studies were judged as high-quality and controlled studies as good quality.

The authors did not state how many reviewers assessed validity.

Data extraction
Data were extracted on the proportion of participants with improved symptoms and/or signs, as reported by the primary studies.

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

Methods of synthesis
Studies were combined in a narrative synthesis, organised by indication for treatment.

Results of the review
Sixteen studies were included (n=1,033 participants; range five to 179); five randomised controlled trials (RCTs, n=230 participants), of which four were blinded and three were placebo controlled; and eleven uncontrolled studies, of which five were prospective (n=336 participants) and six were retrospective (n=467 participants). Three studies were deemed high quality and two good quality.
Results in high or good quality studies (five RCTs)

**Convergence insufficiency:** Two high quality and one good quality RCT (n=153 participants) reported on vision therapy for convergence insufficiency. Two RCTs reported an improvement in symptoms (in 80% and 62% of participants). The third RCT reported that 58% of participants remained symptomatic after 12 weeks' treatment, but their symptoms were significantly reduced. All three RCTs reported an improvement in near point of convergence and positive fusional vergence. No good or high quality studies found an improvement in either signs or symptoms from pencil push-up therapy (two RCTs; n=93 participants) or base-in prisms (one RCT; n=72 participants).

**Accommodative anomaly:** One good quality RCT (n=5 participants) of vision therapy for accommodative anomaly reported an improvement in symptoms in 80% of participants, accompanied by improvement in accommodative amplitude and accommodative facility.

The results of uncontrolled studies were also reported in the review.

**Authors' conclusions**
There was evidence that treatment of convergence insufficiency vision therapy was effective, but that pencil push-up and base-in prism therapy were not effective. There was insufficient evidence to support specific therapeutic options for other non-strabismic binocular anomalies or accommodative disorders.

**CRD commentary**
The objectives and inclusion criteria of the review were clear and relevant sources were searched for studies, although the restriction by publication status and language meant that the review was at risk of publication and language biases. The authors noted that a large recently-published RCT was relevant but it was not included in the review as it had been published since their literature search. Methods to reduce error and bias in the review process were not reported.

It was unclear whether statistical pooling of data was considered, but the characteristics of participants may have been too dissimilar to warrant this. No information was reported on the statistical or clinical significance of review findings, or on statistical variability: this made it difficult to determine the relevance or applicability of the results.

Relevant criteria were used to assess study quality, and quality was taken into account in the interpretation of findings. As the authors acknowledged, even some of the high quality and good quality studies had marked limitations (e.g. small sample sizes, potential selection bias). All the high quality studies were conducted by the same research group.

In view of the suboptimal search and small amount of randomised data, the authors’ conclusions require cautious interpretation.

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

**Practice:** The authors stated that optometrists should treat patients with accommodative and/or non-strabismic binocular dysfunction using their clinical judgement and training.

**Research:** The authors stated that large, well-designed, blinded RCTs with placebo control groups are required to provide evidence about the effectiveness of treatments for each type of dysfunction. Further research is also required to determine the effectiveness of base-in prism reading glasses, using prescription criteria other than the Sheard criterion.

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**Bibliographic details**
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.