**Authors' objectives**
The authors' apparent objective was to systematically review the published scientific evidence regarding the impact of conductive education (CE) on the overall learning and health status of children with cerebral palsy.

**Searching**
The following databases were searched: MEDLINE from 1966 to September 2000; EMBASE from 1988 to July 2000; HealthSTAR from 1975 to January 2000; CINAHL from 1982 to July 2000; ERIC from 1985 to June 2000; PsycINFO from 1984 to July 2000; CBCA Fulltext Education from 1976 to 2000; and Current Contents (via WebSPIRS) from 1997 to Week 44, 2000). The following keywords were used alone and in various combinations: 'conductive education', 'conductive learning', 'intensive therapeutic intervention', 'behavioural intervention', 'learning strategy', 'education', 'strategy', 'therapy', 'therapeutic intervention', 'special education', 'early intervention', 'function training', 'teaching methods', 'client education', 'rehabilitation', 'educational methods', 'cerebral palsy', 'motor dysfunction', and 'motor neurone disease'.

In addition, the websites of the National Institute of Conductive Education (Birmingham, UK), the Inter-American Conductive Education Association, Families of Alberta for CE (FACE), the Cerebral Palsy website, Peto Institute of Conductive Education, the Conductive Association of Ontario, and the National Association for Conductive Education (NACE) were searched. The bibliographies of all the retrieved articles were examined for further studies.

**Study selection**
**Study designs of evaluations included in the review**
Studies of observational or experimental design, which provided evidence of the systematic collection and analysis of the data, were included. Editorials and studies published before 1990 were excluded from the review. The study duration, where reported, ranged from 6 weeks to 3 years.

**Specific interventions included in the review**
Investigations of CE. The included primary studies also had intervention groups that were programmes 'based on CE'. The control groups, where used, were 'special educational programmes', 'early intervention services', 'individual physiotherapy' or 'NDT' (neurodevelopmental therapy).

**Participants included in the review**
Children who had motor disorders such as cerebral palsy, or their parents. The children in the included studies were aged from 19 to 127 months. Studies focusing on CE with adult populations were specifically excluded.

**Outcomes assessed in the review**
The authors did not specify any inclusion or exclusion criteria relating to the outcome measures. The outcome measures used were not described clearly for all of the primary studies, but they did include the following: the Columbia Mental Maturity Scale, Gross Motor Function Measure, Vulpe Assessment Battery, Wechsler Pre-School Scale of Intelligence, Reynell Developmental Language Scale, Parenting Stress index, and the questionnaire on resources and stress.

**How were decisions on the relevance of primary studies made?**
Two reviewers assessed and selected the published studies on the basis of the specified inclusion criteria.

**Assessment of study quality**
The methodological quality of the included studies was assessed using criteria derived from a variety of sources (see Other Publications of Related Interest nos.1-3). The assessment included elements relating to the sampling strategy, population, setting, intervention, statistical methods, and outcome measures. Study quality was assessed by two independent reviewers for the primary studies of children, and by one reviewer for the studies of parents.
Data extraction
The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
The studies were combined using a narrative summary.

How were differences between studies investigated?
The authors do not state how any differences between the studies were investigated.

Results of the review
Six studies (n=173) of the effectiveness of CE on children were included. There were 4 prospective controlled studies (one with partial randomisation) with a total of 150 participants (77 intervention and 73 control), and 2 observational studies with a total of 23 participants. In addition, there were 3 studies of parents: one non-randomised controlled prospective study, and one prospective and one retrospective observational study; the total numbers of participating parents or children were unclear.

The strength of evidence was determined using the criteria described by Lonigan et al. (see Other Publications of Related Interest no.3) for empirically-supported treatments. Using these criteria, CE could not be considered as either ‘a well-established psychosocial intervention for childhood disorders’ or ‘a probably efficacious psychosocial intervention for childhood disorders’.

There was no good scientific evidence to support the use of CE in place of other treatment programmes for children with cerebral palsy. The research available was methodologically inadequate. However, with the exception of one study that showed the CE group experienced decreased hip mobility, no harm from CE programmes was noted in any of the studies. Children in CE groups kept pace with their peers who received other types of therapy.

Authors’ conclusions
The studies to date have major limitations, and thus, the evidence on the efficacy and effectiveness of CE is sparse and of poor quality. The efficacy of CE is not established, nor is the nature of CE well-defined, as it is a fast-developing educational approach.

CRD commentary
This review apparently set out to address a broad research question around the general effectiveness of CE. The objectives of the review were poorly described, and were only vaguely defined in terms of the intervention, patient population, outcome measures, and study design. The search of the published literature was comprehensive, but no attempt was made to identify unpublished data. As the authors did not report any assessment of publication bias, the potential impact of unpublished data on their conclusions should be considered. Study quality was not assessed using a published validated tool, although the authors reported their critical appraisal criteria in detail. Some key elements of methodological quality, e.g. blinding, were absent from these criteria; the potential impact or relevance of un-assessed biases in the primary studies should therefore be considered.

The detailed critical appraisals of the individual included studies were reported, and the issues arising from them were discussed by the authors. Details of the individual studies were tabulated. The participants' demographic details were sparse; combined with the broad inclusion criteria used by the review, it is difficult to determine to which patient populations the study results could be applied. In addition, there was little detail of the CE programmes used in the individual studies, and from the details supplied, it seems likely that they varied considerably. Within the limitations of the available evidence, the included studies were well summarised and a critical appraisal of each was presented.

The authors discussed the limitations of the existing evidence base and its implications for future research in the field.

Implications of the review for practice and research
Practice: The authors state that there is no good scientific evidence to support the use of CE in place of other treatment
programmes for children with cerebral palsy.

Research: The authors state that there is a need for rigorous studies and programme evaluations of CE. True experimental designs that control for extraneous variables (e.g. the influence of extraneous events, maturation bias, testing and instrumentation bias, statistical regression, selection biases, attrition and diffusion of intervention) would require control and experimental groups where the participants are randomly assigned. At the very minimum, groups should be carefully matched to equate the participants or to hold extraneous variables constant.

Most studies on CE provide little information about the characteristics of the participants and rely on small samples. These are important considerations for future evaluations. In addition, the programmes and therapeutic evaluations need to be described at length, and it is desirable to utilise treatment manuals that provide a detailed description of the interventions.

It would be useful if studies on CE isolated the two main components of CE (the inclusion of pedagogy and conduction) and evaluated their effectiveness. This could be accomplished by comparing children who receive the isolated component, such as the presence of a conductor, with those who do not.

Outcome measures for the evaluation of CE need to be comprehensive. Parental outcomes such as parental satisfaction, parental coping and learning, merit examination in future research. Clinical outcomes could also be measured and included in a discussion of the programme effectiveness.

Qualitative methods of research could be used to study outcomes of CE. It is clear from the work reviewed that there is very little understanding of the CE experience for children and the perceived value to the parents. Rigorously applied qualitative methodologies would help shed some light on this.

Finally, CE should be evaluated in the setting it has been adapted to, since CE is practised differently in different countries because of different social contexts. The outcomes and conclusions from research conducted in other countries, or from other programmes, may not be transferable to other settings. Local evaluation of CE is imperative.

Bibliographic details

Original Paper URL

Other publications of related interest


Indexing Status
Subject indexing assigned by CRD

MeSH
Cerebral Palsy /rehabilitation; Child, Preschool; Early Intervention (Education); Infant; Motor Skills

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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.