A meta-analytic study on the effectiveness of comprehensive ABA-based early intervention programs for children with autism spectrum disorders

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CRD summary
The authors concluded that comprehensive early intervention behavioural intervention was effective in children with autism spectrum disorders compared with other treatments or usual practice in terms of IQ and adaptive behaviours. The authors' conclusion did not reflect the total evidence presented. Inadequate reporting of the review process means that caution is required when judging the reliability of the review findings.

Authors' objectives
To evaluate the effectiveness of comprehensive early intervention behavioural interventions (EIBI) based on applied behaviour analysis (ABA) in young children with autism spectrum disorders.

Searching
MEDLINE, PsycINFO and ERIC were searched. Search dates were not reported. Search terms were presented. A manual search of several relevant journals was carried out. Retrieved studies were checked for further articles of interest. The review was restricted to studies published in English between 1980 and 2009.

Study selection
Controlled studies with a pre-test/post-test design and that evaluating EIBI in young children aged 10 years or under at treatment onset and diagnosed with autism spectrum disorders (Diagnostic and Statistical Manual of Mental Disorders (DSM) -III, DSM-III-R, DSM-IV or International Classification of Diseases Autistic Disorder and Pervasive Developmental Disorder-Not Otherwise Specified) were eligible for inclusion. EIBI had to address all three core deficits in autism using applied behaviour analysis. Eligible outcomes were standardised measures of IQ, language and adaptive behaviour, presented as means and standard deviations. Studies that did not report means and standard deviations for both pre- and post-test data were excluded.

Included participants were children with autism spectrum disorders. Average age ranged from 33.6 to 65.7 months. More than half of the participants were male. Average IQ ranged from 27.5 to 76.5. Average duration of EIBI ranged from 12.5 hours to 38.5 hours over a period of 10 months to over two years. Control groups received a less intensive version of EIBI, parent-directed applied behaviour analysis or usual treatment (public early intervention, nursery provision, Portage and school-based interventions).

One reviewer selected studies. A second reviewer was involved in checking a sample of articles from one database.

Assessment of study quality
Study quality was assessed using the Down's and Black (1998) checklist. Maximum achievable score was 32 points. No details of individual checklist items were reported.

Two authors independently carried out the quality assessment.

Data extraction
Data were extracted or calculated (divide outcome in months by chronological age in months, multiply by 100) for mean differences (MD) and standard deviations. Where a study had two control groups, a weighted mean and standard deviations were calculated. 95% confidence intervals (CI) were presented.

The authors did not state how many reviewers carried out data extraction.
Methods of synthesis
Weighted mean differences (WMD) and 95% CIs were estimated using random-effects models. Statistical heterogeneity was assessed by Galbraith plots and $I^2$ measures. Publication bias was assessed using funnel plots (not shown).

Results of the review
Eleven studies (n=344 patients) were included in the review. There was one randomised controlled trial (n=28); the other trials were controlled pre-test/post-test designs. Mean quality score was 24.65 (standard deviation 1.29, range 23 to 27 out of 32).

Statistically significant differences in favour of comprehensive EIBI were reported for full scale IQ (WMD 11.98, 95% CI 6.73 to 17.23; 10 studies), non-verbal IQ (WMD 11.09, 95% CI 1.88 to 20.30; five studies), expressive language (WMD 15.21, 95% CI 8.43 to 21.99; five studies), receptive language (WMD 13.94, 95% CI 10.14 to 17.75; five studies), adaptive behaviour (WMD 5.92, 95% CI 2.72 to 9.13; seven studies). Subscales of adaptive behaviour were communication (WMD 10.44, 95% CI 5.03 to 15.85; seven studies), daily living skills (WMD 5.49, 95% CI 3.36 to 7.61; seven studies) and socialisation (WMD 4.96, 95% CI 0.18 to 9.75; seven studies). The sole RCT (n=28) showed statistically significant differences in favour of EIBI for full scale IQ and non-verbal IQ. Results for all other outcome measures were not statistically significant.

Statistical heterogeneity was reported for IQ, communication and daily living skills domains of the Vineland Adaptive Behaviour Scale and expressive language.

Authors' conclusions
There was strong support for the effectiveness of EIBI in children with autism spectrum disorders compared with other treatments or usual practice in terms of IQ and adaptive behaviours.

CRD commentary
The review addressed a clear research question supported by potentially reproducible inclusion criteria. The search strategy included some relevant sources. The restriction to published articles in English in the final selection of studies meant that associated biases could not be ruled out. The review process included attempts to minimise error and bias in the assessment of study quality, but the presentation of summary quality scores without details of the individual criteria made further interpretation difficult. There was potential for reviewer error and bias in study selection and data extraction. It was unclear whether the chosen method of synthesis was appropriate, given the level of statistical and clinical heterogeneity acknowledged by the authors. Funnel plots were reported to show some suggestion of publication bias, but statistical tests did not support this ($p>0.22$).

Given that results for the RCT were not consistent with other studies on outcomes other than IQ, the authors' conclusion does not reflect the total evidence presented and may be overstated. Inadequate reporting of the review process means that caution is required when judging the reliability of the review findings.

Implications of the review for practice and research
Practice: The authors stated that future practice might best be focused on improving child adaptive behaviour.

Research: The authors stated that future research should identify the relationship with treatment outcome of characteristics other than baseline IQ and age at treatment onset. Research on more intensive EIBI and other teaching strategies should be considered for children who did not respond to routine EIBI.

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