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Curing dyslexia and attention-deficit hyperactivity disorder by training motor co-ordination: Miracle or myth?

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Abstract

Dore Achievement Centres are springing up world-wide with a mission to cure cerebellar developmental delay, thought to be the cause of dyslexia, attention-deficit hyperactivity disorder, dyspraxia and Asperger's syndrome. Remarkable success is claimed for an exercise-based treatment that is designed to accelerate cerebellar development. Unfortunately, the published studies are seriously flawed. On measures where control data are available, there is no credible evidence of significant gains in literacy associated with this intervention. There are no published studies on efficacy with the clinical groups for whom the programme is advocated. It is important that family practitioners and paediatricians are aware that the claims made for this expensive treatment are misleading.

Keywords

attention-deficit hyperactivity disorder; cerebellum; dyslexia; exercise; treatment

The Dore Programme

Conditions such as developmental dyslexia, attention-deficit hyperactivity disorder (ADHD), dyspraxia and Asperger's syndrome are of considerable clinical importance: they are relatively common neurodevelopmental disorders, which cause misery to children and their parents. Although there are recognised approaches to treatment, more severe forms of disorder are not easy to remediate¹ and many affected children will have life-long problems. According to Wynford Dore, a businessman who started the Dore Achievement Centres, this need not be so.² He maintains that he has not only identified the root cause of many learning difficulties – cerebellar developmental delay – but has also found a way to cure it. Demand for the Dore Programme, a series of exercises done for around 10 min twice a day, escalated after it was featured on UK national prime-time TV early in 2002, and there are now 17 Dore Achievement Centres in Australia. Although most of the promotion of the treatment is based on personal testimonials, these are backed up by research. Dore² pointed to a study showing that treatment led to a nearly fivefold improvement in comprehension, a three-fold improvement in reading age, and a 17-fold improvement in writing. The programme costs around \$A4000, but as Dore pointed out: 'Compare it to the price of braces for teeth, breast implants, a family holiday or upgrading your car. Surely it is a price worth paying in the attempt to transform the life of your child?' (p. 171)².

Key Points

1. The treatment offered by Dore Achievement Centres is being promoted as a “drug free” alternative to conventional treatment for ADHD, and as a ‘miracle cure’ for dyslexia. It is presented as having a neurological rationale and gains credibility by appearing to be medical treatment.
2. The publication of two papers in peer-reviewed scientific journal (*Dyslexia*) has been presented as giving further credibility to the treatment. However, the research community in this area has been dismayed that work of such poor standard has been published.
3. The research purporting to show efficacy of the treatment does not show sustained gains in literacy scores in treated vs. control children. Furthermore, the intervention has not been evaluated on the clinical groups for which it is recommended.

Cerebellar Basis of Neurodevelopmental Disorders

The notion that the cerebellum might be implicated in some children’s learning difficulties is not unreasonable: both post-mortem and imaging studies have reported cerebellar abnormalities.³ Furthermore, some studies have reported behavioural deficits involving balance and automatization of motor skills in a subset of people with dyslexia, consistent with a cerebellar deficit hypothesis. However, it is premature to conclude that abnormal cerebellar development is the cause of dyslexia, rather than an associated feature. Many people with dyslexia do not show any evidence of motor or balance problems.^{4,5} Furthermore, the cerebellum is a plastic structure which can be modified by training,⁶ raising the possibility that cerebellar abnormalities might be a *consequence* of limited experience in hand-writing in those with poor literacy.

Dore, however, claims that ‘Cerebellar Developmental Delay’ is the cause of children’s problems, and that training skills mediated by the cerebellum will lead to improvement in other domains (e.g. reading, social skills). Even Dore’s supporters note that this requires ‘something of a leap of faith’ (p. 52)⁷, given that the cerebellum consists of many autonomous regions. Studies showing that cerebellar function can be modified by training typically focus on improvement in the specifically trained skill. The gaping hole in the rationale for the Dore Programme is a lack of evidence that training on motor-co-ordination can have any influence on higher-level skills mediated by the cerebellum. If training eye–hand co-ordination, motor skill and balance caused generalised cerebellar development, then one should find a low rate of dyslexia and ADHD in children who are good at skateboarding, gymnastics or juggling. Yet several of the celebrity endorsements of the Dore programme come from professional sports people.

Efficacy of the Dore Programme: The Published Research Evidence

The journal *Dyslexia* has published two papers describing consecutive phases of a research project conducted at a UK primary school.^{7,8} The first paper was followed by nine critical commentaries, with one commentator resigning from the journal’s Editorial Board. The second evoked an even stronger reaction, with five more resignations. To understand the strength of this reaction, one needs to appreciate the mismatch between what the data showed and what was claimed.

Children were selected for inclusion in the study because they had significant risk scores on the Dyslexia Screening Test.⁹ The design of the study was a randomised controlled trial,

with one group receiving the Dore Programme and the other receiving no treatment. Although a placebo treatment would have been methodologically tighter, the no-treatment group does control for important confounds, in particular the tendency of children to improve with maturation, and with practice on the tests, and the possible impact of other intervention they may be receiving. Testing of children before and after the treatment phase was done blind to group status. Unfortunately, despite these strengths, the study had some fatal weaknesses, the most serious of which was that the control group was largely ignored when analysing results and drawing conclusions from the study. The only tests given to all children as part of the study were from the Dyslexia Screening Test, a brief assessment intended to screen for children at risk of literacy problems rather than providing a sensitive measure of individual differences. Because its authors embrace a cerebellar theory of dyslexia, measures of bead-threading and balance are included along with more conventional literacy tests in the criteria for identifying risk for dyslexia. As shown in Figure 1, the data on literacy tests did not provide convincing evidence for the efficacy of the Dore Programme; gains were common in the control group as well as in the trained group, presumably reflecting practice effects. Furthermore, despite random assignment, children in the treated group had lower initial scores than those in the control group.¹⁰ The only literacy test showing a significantly larger gain in the treated group was a word reading test ('one minute reading'), on which the treated group had a lower score to start with and so more room for improvement. At delayed follow-up, after the control group had received 6 months of treatment, their mean score on this subtest fell relative to their pretreatment percentile, failing to replicate the 2003 results.⁸

The authors presented other relevant data from achievement tests given to the whole school as part of regular educational assessments. However, the timing of these tests was not synchronised with the study. This meant that there were no data corresponding to a time when the treatment group had had intervention and the control group had not – because the control group had embarked on treatment at the end of the first phase. Accordingly, the authors presented the data only from the treated group. Although one of the school measures came from a standardised reading test with good psychometric properties, the others were taken from Standard Assessment Tasks (SATs), which are blunt instruments involving some subjective judgement by teachers.¹¹ On these measures there were no control data, and the authors made the dubious assumption that they could assess treatment effects by dividing the gain seen in the year after treatment with gain seen in the year before treatment. It is from these analyses that the remarkable claim comes that there is a 17-fold increase in writing skills after treatment: this is the figure one ends up with when comparing mean SATs scores of 2.53 (July 2000), 2.56 (July 2001) and 2.95 (July 2002) using the method described above. Without control data it is impossible to tell whether such changes are meaningful, especially as the SATs were administered by different teachers in different years. In the 2007 paper⁸ the authors present further reading test data, and mention a parental checklist of attention-deficit symptoms which decline after treatment. Again, there are no control data, so we cannot know whether this is age-related change. After all, children's shoe size will have increased during the study, yet we would not conclude that the intervention made their feet grow. There is nothing here to justify the claims made that the Dore Programme is more effective than state-of-the-art medication for ADHD,² especially in view of the fact that only one child in the study had an ADHD diagnosis.

The data in Figure 1 emphasise another odd feature of this study. The Dore programme is marketed as a cure for dyslexia, a condition that is usually diagnosed by demonstrating a significant mismatch between general ability and literacy skills. One would expect a child with this diagnosis to have marked problems on literacy measures (typically one SD or more below age level, corresponding to 16th percentile). The mean scores of the children in this

study were better than this, consistent with the fact that only a minority of them had diagnoses of specific learning difficulties.

The 2003 paper also reported data on the vestibular and postural tests used at Dore Achievement Centres to diagnose cerebellar problems and determine treatment. However, the authors noted that there were no norms for children on these tests. One is left wondering how these measures can be interpreted in a diagnostic setting.

Overall, family doctors and paediatricians need to be aware that the published evidence does not support the claims of a 'Miracle Cure': on the contrary, the data from comparisons of treated and control groups lead to considerable scepticism that the intervention improves anything other than those skills that are trained in the exercises.

References

1. Torgesen JK. Individual differences in response to early interventions in reading: the lingering problem of treatment resisters. *Learn. Disabil. Res. Prac.* 2000; 15:55–64.
2. Dore, W. *Dyslexia: the Miracle Cure*. John Blake Publishing; London: 2006.
3. Bishop DVM. Cerebellar abnormalities in developmental dyslexia: cause, correlate or consequence? *Cortex*. 2002; 38:491–8. [PubMed: 12465664]
4. Rochelle KSH, Talcott JB. Impaired balance in developmental dyslexia? A meta-analysis of the contending evidence. *J. Child Psychol. Psychiatry*. 2006; 47:1159–66. [PubMed: 17076755]
5. Savage R. Motor skills, automaticity, and developmental dyslexia: a review of the research literature. *Read. Writ.* 2004; 17:301–24.
6. Black JE, Isaacs KR, Anderson BJ, Alcantara AA, Greenough WT. Learning causes synaptogenesis, whereas motor activity causes angiogenesis, in cerebellar cortex of adult rats. *Proc. Natl. Acad. Sci.* 1990; 87:5568–72. [PubMed: 1695380]
7. Reynolds D, Nicolson RI, Hambly H. Evaluation of an exercise-based treatment for children with reading difficulties. *Dyslexia*. 2003; 9:48–71. [PubMed: 12625376]
8. Reynolds D, Nicolson RI. Follow-up of an exercise-based treatment for children with reading difficulties. *Dyslexia*. 2007; 13:78–96. [PubMed: 17557685]
9. Fawcett, AJ.; Nicolson, RI. *The Dyslexia Screening Test*. The Psychological Corporation; London: 1996.
10. Snowling MJ, Hulme C. A critique of claims from Reynolds, Nicolson & Hambly (2003) that DDAT is an effective treatment for children with reading difficulties – 'lies, damned lies and (inappropriate) statistics?'. *Dyslexia*. 2003; 9:127–33. [PubMed: 12775086]
11. Singleton C, Stuart M. Measurement mischief: a critique of Reynolds, Nicolson and Hambly. *Dyslexia*. 2003; 9:151–60. 2003. [PubMed: 12940298]

Fig. 1.

Mean percentile scores on literacy measures from Dyslexia Screening Test for treated and control children from Reynolds *et al.*⁷ Standard errors were not provided by the authors. Significant interactions between group and pre-/post-test were found only for word reading, where Treated group had lower scores on pre-test. (□) Pre-test, (■) post-test.