INT. J. LANG. COMM. DIS., 2010,
VOL. 00, NO. 0, 1–9

informa
healthcare

Research Report

Indirect language therapy for children with persistent language impairment in mainstream primary schools: outcomes from a cohort intervention

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(Received September 2009; accepted December 2009)

Abstract

Background: A manualized language therapy developed via a randomized controlled trial had proved efficacious in the short-term in developing expressive language for mainstream primary school children with persistent language impairment. This therapy had been delivered to a predetermined schedule by speech and language therapists or speech and language therapy assistants to children individually or in groups. However, this model of service delivery is no longer the most common model in UK schools, where indirect consultancy approaches with intervention delivered by school staff are often used.

Aims: A cohort study was undertaken to investigate whether the therapy was equally efficacious when delivered to comparable children by school staff, rather than speech and language therapists or speech and language therapy assistants.

Methods & Procedures: Children in the cohort study were selected using the same criteria as in the randomized controlled trial, and the same manualized therapy was used, but delivered by mainstream school staff using a consultancy model common in the UK. Outcomes were compared with those of randomized controlled trial participants.

Outcomes & Results: The gains in expressive language measured in the randomized controlled trial were not replicated in the cohort study. Less language-learning activity was recorded than had been planned, and less than was delivered in the randomized controlled trial. Implications for 'consultancy' speech and language therapist service delivery models in mainstream schools are outlined.

Conclusions & Implications:

Keywords: speech and language therapy, specific language impairment (SLI), evidence-based practice (EBP), teachers, education, expressive language.

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International Journal of Language & Communication Disorders
ISSN 1368-2822 print/ISSN 1460-6984 online © 2010 Royal College of Speech & Language Therapists
http://www.informahealthcare.com
DOI: 10.3109/13682820903560302

What this paper adds

What is already known on this subject

Evidence from a full-scale randomized controlled trial showed that language intervention for children with persistent expressive language impairment could still be effective in the primary school years if delivered for an average of 22 hours by a speech and language therapist or speech and language therapist assistant, to children individually or in groups, compared with a 'usual therapy' control. This is not, however, the common UK model, as speech and language therapists usually work as consultants to school staff, who deliver language-learning activities within school settings. This provides opportunities for transfer and generalization of learning. However, the effectiveness of this approach was not known.

What this study adds

This cohort study adopted the UK consultancy model, with language impaired children selected to the same criteria and with language intervention materials that had been successful in the randomized controlled trial, but with language-learning activities delivered by classroom staff. Historical control was by comparison with randomized controlled trial participants. The efficacy of this approach was not demonstrated as children did not make the significant progress that had been shown following research intervention in the randomized controlled trial, although their progress was comparable with the 'usual therapy' randomized controlled trial control group. The non-significant progress appeared to be related to a lower amount of time spent on language-learning activities in the school-based cohort study.

Background

Primary school aged children with severe and persistent expressive language impairment (E-LI) or receptive-expressive language impairment (RE-LI) in the United Kingdom are often educated in their local mainstream school, in line with policies of social inclusion (Department for Education and Science (DfES) 2001, Scottish Executive 2002). Mainstream schools offer social and educational benefits, and access to listening and talking curriculums designed to develop children's language skills (Learning and Teaching Scotland 2008, Qualifications and Curriculum Authority 2008). Co-professional working is expected (DfES 2004, Scottish Executive 2004), with speech and language therapists (SLTs) as key professionals in teams supporting children (Gascoigne 2006).

When language impairment continues beyond the age of 6, it often continues into adult life (Young *et al.* 2002), limiting school attainments (Conti-Ramsden *et al.* 2009), although such children may have more opportunities to remain in education than previous generations (Durkin *et al.* 2009) and may leave compulsory schooling with positive expectations of the future (Palikara *et al.* 2009). Children with severe and persistent language impairment require targeted and specialist language-learning opportunities, and often receive these via a consultancy model where SLTs give advice and guidance to classroom staff, who carry out relevant language-learning activities (Law *et al.* 2002). However, the recent Bercow Report of services for children and young people with speech, language and communication needs in England (Department for Children, Schools and Families (DCSF) 2008: 61) found unacceptable variation and a lack of equity in the provision offered to children, despite many examples of good practice.

An efficacious intervention: the randomized controlled trial (RCT)

A cohort study was undertaken to evaluate the efficacy of a consultancy model of language therapy in mainstream schools. The historical control group for the cohort was a group of children who had participated in an RCT of comparable language intervention. This study is summarized here to clarify the context.

The RCT (detailed in Boyle *et al.* 2007, 2008) offered language intervention to children with severe and persistent E-LI or RE-LI, comparing direct delivery (by an SLT) and indirect delivery (by a speech and language therapist assistant (SLTA)), and each of these to children in groups or individually. Control was by a fifth set of children randomized to continue with their 'usual therapy', delivered by their community SLT service. Primary outcome measures were scores on the *Clinical Evaluation of Language Fundamentals — Third Edition UK* (CELF-3^{UK}; Semel *et al.* 2000: Adjusted Norms 2003), a standardized test of language understanding and use, with measures of parent and teacher satisfaction as secondary outcomes. A cost–benefit analysis was also undertaken (Dickson *et al.* 2009).

For children in the RCT receiving research intervention, language-learning activities were tailored to each child's needs, with targets set by a research SLT.

Language-learning activities were taken from a therapy manual developed for the project.[1] Intervention was within a child's mainstream school, with some grouped children travelling to a nearby school by escorted taxi. There was 'blind' assessment of outcomes by SLTs not otherwise involved in the project who did not know which mode of therapy had been undertaken by a child.

A total of 161 children were randomly allocated on an intention-to-treat basis: 130 to one of the four research modes and 31 continuing with their usual therapy. Pre-intervention testing showed that, as intended, children in the five modes did not differ significantly on pre-intervention language or intelligence quotient (IQ) measures. A total of 152 children completed both pre- and post-therapy assessments.

Research intervention children undertook three 30–40-minute sessions weekly over 15 weeks, that is, a maximum of 45 sessions. There was high compliance: 124 children completed intervention; the mean number of sessions was 38 (range = 13–45), or around 22 hours of intervention on average. All four research intervention modes were acceptable to parents, teachers, and project SLTs and SLTAs.

The 31 RCT 'usual therapy' control children mostly received 'consultancy' services through advice and guidance given by SLTs to their school staff and families. They recorded much less contact with an SLT than those receiving research intervention. An audit of their contact with SLT services during a school year (around 40 weeks) obtained data on 28 children and showed half (14) had received no SLT or SLTA contact. The remaining 14 averaged 16 contacts with an SLT or an SLTA, which would equate to around six contacts over a 15-week period, the period during which research children averaged thirty-eight 30–40-minute contacts.

Analysis of covariance (ANCOVA) immediately post-intervention showed no difference in outcome (CELF-3^{UK}) comparing the four research intervention modes. However, when the four research intervention modes were combined, there were benefits to expressive language for research-intervention children compared with controls immediately post-intervention, after controlling for language scores on entry. The effect size was +55. Post-intervention results from the RCT are presented in table 1 (from Boyle *et al.* 2007: 35).

There was no significant benefit to receptive language at any point for research intervention children compared with control children. This result reflects the findings of other studies where difficulties in effecting language change for children with persisting RE-LI are widely reported. These are summarized in ~~Boyle~~ *et al.* (~~2009~~). Also, there were no significant receptive or expressive language changes for the group of control children receiving their 'usual therapy'.

By 1-year follow-up, no child had received further project therapy. A total of 152 children could be followed up and around one-quarter of them did not receive any contact with an SLT or an SLTA. One moved into a language unit and received 115 contacts; the others averaged around six contacts over the year. Expressive language scores had not continued to accelerate.

The RCT intervention therefore comprised an efficacious therapy for children with E-LI, although not RE-LI, over the short-term, having delivered a larger amount of contact with SLT services than was received by 'usual therapy' control children.

Aims

The RCT outlined above demonstrated the efficacy of therapy intervention in respect of E-LI, but the delivery pattern via research SLTs and SLTAs does not reflect the usual UK service delivery model, which is via school-based consultancy. A cohort intervention

Table 1. Randomized controlled trial (RCT): results from analyses of covariance (ANCOVAs) of adjusted scores post-intervention for CELF-3^{UK} expressive language scores for therapy mode versus control

Therapy mode	*F* (d.f.)	*p*	Adjusted mean difference (intervention – control) and effect size	95% Confidence interval for difference
Intention to treat analyses (ITT)				
Direct versus control	4.89 (1,91)	0.029*	3.060 Eta^2 = 0.051 *d* = 0.47	0.31/5.81
Indirect versus control	2.14 (1,91)	0.147	1.960 Eta^2 = 0.017 *d* = 0.26	−0.70/4.62
Individual versus control	4.09 (1,93)	0.046*	2.955 Eta^2 = 0.042 *d* = 0.41	0.05/5.86
Group versus control	2.83 (1,89)	0.096	2.120 Eta^2 = 0.031 *d* = 0.37	−0.38/4.62
Protocol analysis				
Direct versus control	4.02 (1,84)	0.048*	3.036 Eta^2 = 0.046 *d* = 0.43	0.03/6.05
Indirect versus control	1.40 (1,84)	0.241	1.804 Eta^2 = 0.016 *d* = 0.26	−1.23/4.84
Individual versus control	2.67 (1,89)	0.106	2.560 Eta^2 = 0.029 *d* = 0.34	−0.55/5.67
Group versus control	2.828 (1,79)	0.097	2.451 Eta^2 = 0.035 *d* = 0.39	−0.45/5.35

Notes: d.f., Degrees of freedom. *Significant at the 0.05 level.

therefore recruited children to the same language and non-verbal criteria as the RCT, attempted to implement the same therapy regime, and used activities from the same therapy manual. Language goals and language-learning activities were selected by the research SLT in ~~collaboration~~ with the child's class teacher, but were delivered by classroom staff. Comparison was with results for the RCT control children (historical control).

The principal research question was whether or not children who participated in the cohort intervention made language gains comparable with children in the RCT, as measured by the same standardized assessments. There were secondary measures of phonological processing and reading. Parent, child, and teacher views were also collected, but are not reported here.

Methods and procedures

Study design

The design comprised a cohort intervention, with historical control using results from the 'usual therapy' children from Boyle *et al.* (2007), carried out in one Scottish education authority during one school year.

Participants

Language and non-verbal eligibility criteria were the same as in the RCT. Participants had a diagnosis of language impairment (RE-LI or E-LI), were aged 6–11 years, and attended their local mainstream primary school. On entry they scored less than −1.25 standard deviation (SD) on the receptive and/or expressive scales of the CELF-3^{UK}. Children had documented normal hearing and no neurological impairment, pervasive developmental disorder, or severe learning difficulties as measured by non-verbal IQ scores greater than 75 on the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler 1999). Importantly, they had no speech, fluency, swallowing or alternative/augmentative communication needs or any other factors that would require the specialist skills and knowledge of an SLT. This was assessed by referring SLTs, and confirmed by a research SLT at pre-intervention assessment.

Unlike the RCT, where school success was not an entry criterion, cohort study children were causing educational concern and were receiving school-based learning support services to develop literacy, further demonstrating the impact of language impairment on educational attainment. As there was an interest in literacy as well as language development, children in the cohort study were also assessed pre- and post-intervention on a standardized test of reading comprehension and accuracy, the Neale Analysis of Reading Ability: Second Revised British Edition (NARA-II; Neale 1997) and a standardized phonological awareness test, the Phonological Assessment Battery (PhAB; Frederickson *et al.* 1997). Children with RE-LI were included to allow comparison with the control group. Further, education staff could readily provide contextual extension of language activities and practice opportunities in the primary classroom, which it was hoped would prove beneficial to children with receptive difficulties. The RCT had also shown that the intervention was not harmful, and that 95% of parents of children who had received research intervention and who responded to a post-intervention questionnaire reported that their child had enjoyed therapy (Boyle *et al.* 2007: 50).

Planned intervention

The research SLT identified language targets for each child pre-intervention in discussion with their class teacher and where possible their learning support teacher. A plan for the delivery of language-learning activities was made at this time, and a mid-intervention meeting between the research SLT and the class teacher was planned to monitor child progress. Delivery involved school staff and included class teachers, learning support teachers and/or classroom assistants as available to an individual child. Some children worked with more than one staff member or in a small group of children, and some staff with more than one child. Language-learning materials were supplied by the research project and language-learning activities were taken from the therapy manual written for the RCT (McCartney 2007). This manual lists activities to support comprehension monitoring and the development of vocabulary, grammar and narrative, and offers advice for teachers on creating a 'communication friendly' classroom.

Teachers or classroom assistants were asked to log when language-learning activities were carried out, and to write comments on child responses, on a chart provided. Relevant language-learning activities may also have taken place during ongoing classroom work. Intervention was planned to take place on the same schedule as the RCT, over a 4-month period.

Outcome measures

Principal outcome measures were again changes to CELF-3^{UK} scores. After intervention had begun, smoothed and adjusted norms were published for CELF-3^{UK} and scores have been recalculated here to these norms, allowing comparison with RCT participants' results which were also recalculated and published using the updated norms. Secondary

outcomes were measures of reading (NARA-II) and phonological processing using the PhAB.

Sample size

Given a significance level of 0.05 on two-tailed *t*-tests, 60 children with E-LI would be needed to detect the effect size of +0.55 obtained in the RCT (Cohen 1988). However, the historical comparison group contained 31 children, and a comparable number of clinically similar children was required. Children with RE-LI were included, as discussed above. A cohort of 40 LI children was therefore sought to allow for attrition. This number is sufficient to detect an effect size of +0.65.

Approvals and ethics

Ethical approval was obtained from the University of Strathclyde Research Ethics Committee and Forth Valley NHS Board Ethics of Research Committee (LREC 887).

Assessments

Language and non-verbal IQ measures at baseline were assessed by the project SLT or by the child's community SLT. As a cohort study, blind assessment of outcomes was not possible. To minimize bias, post-intervention language assessments were made by SLTs employed by the project with no other connection to the trial and who had not previously met any cohort child. Secondary measures of reading outcome pre- and post-intervention were assessed by the child's learning support teacher.

Statistical methods

An intention-to-treat analysis was carried out using CELF-3^{UK} pre- and post-intervention language outcomes for the cohort. A second analysis compared pre- and post-intervention CELF-3^{UK} scores for the cohort with the historical control group, that is, the 31 pupils randomly allocated to the RCT control group. For this analysis, missing post-intervention scores for two pupils were replaced by their pre-intervention scores.

Results

Recruitment and flow of participants

Names of potential children were received from a child's SLT or learning support teacher. In order to ensure that a school could support the intervention, each referred child's head teacher was contacted and informed that a child in a particular class had been put forward for assessment. The child was not named at this stage to maintain pupil confidentiality. The head teacher then confirmed whether, should the child and family consent and the child prove eligible, the school would be able to support the intervention. This was to prevent families assenting to a research intervention that could not be delivered due to school factors. If head teacher agreement was received, the child and family were contacted and given project information sheets. If they formally consented to enter the study the child was assessed and those who met the language and non-verbal IQ criteria received research intervention.

The flow of participants appears in table 2.

There were 42 primary schools within the education authority. Intervention was delivered to 38 eligible children within nineteen schools and 33 classes in the intention-to-treat cohort.

Compliance with the intervention

Twenty pre-intervention meetings could not include the relevant learning support teachers, who were contacted separately. A minimum of three language intervention targets was set per child. Sixteen mid-intervention meetings could not take place due to research SLT illness. The number of intervention weeks per child was calculated from the date on which details of planned language activities were received by the school until reassessment, excluding school holidays. The mean was 16.58 weeks (SD 1.75, range = 13–21). Children could have been absent from school during this period, and the start of intervention could have been delayed by some schools.

Logs of language-learning activities that had been maintained throughout the entire intervention period were returned for 27 (71%) eligible children (including one late return) with comments included for 17 (45%): remaining logs were not received or were incomplete. Completed charts logged the number of language-learning contacts as a mean of 26 (range = 8–70) over the 4-month intervention period, equivalent to one or two per week. The length of a contact was not usually recorded, and language-learning activities could also have been carried out in class without being logged, so no data are available on how long in total children spent on targeted language work.

Outcomes

Descriptive statistics are shown in table 3. As table 3 indicates, two children were not available for reassessment post-intervention, eight were unable to complete

Table 2. Flow of participants

Flow of participants	Continued	*n*	Discontinued	*n*
Enrolment	Referred	89	Head teacher could not support intervention	7
	Parents contacted	82	Consent not received: 17 no reply, six no consent	23
	Consent received, child assessed pre-intervention	59	Excluded from further analysis: one transferred to another care package before starting intervention; 13 CELF scores too high; three WASI scores too low. Three children with WASI score 2 points too low undertook intervention following written ethics committee permission; one further child received intervention based upon the CELF-3^{UK} (2000) norms, but was not eligible on adjusted norms. All these children are excluded from further analysis	21
Intention to treat: received intervention	Received intervention	38		
Protocol analysis: T1 and T2 assessments	Reassessed post-intervention	36	No post-intervention assessment: one ill, one long-term vacation	2

the NARA-II pre- and seven post-intervention, and several children could not complete all PhAB subtests.

Two-tailed repeated measures *t*-tests revealed no statistically significant differences between pre- and post-intervention receptive or expressive scores on the CELF-3^{UK} (all $t \leq 1.54$, $p > 0.132$) or on the secondary outcome measures (PhAB all $p > 0.92$, NARA-II all $p > 0.81$).

Comparison with the historical RCT control group

There were no significant differences between cohort participants and the RCT control group in terms of gender (31 males and seven females in the cohort; 27 males and four females in the RCT control group: $\chi^2 = 0.388$, $p = 0.743$, two-tailed test). The cohort study children were some 9 months older on average (average ~~CA~~ λ 105.28 months versus 97 months). This was statistically significant ($t = 2.18$, $p = 0.033$, two-tailed test) but chronological age had not affected the response to treatment in the RCT (Boyle *et al.*, 2007: 36). There were no significant differences between the two groups in pre-intervention scores for expressive or receptive language on the CELF-3^{UK} (all $t \leq 1.25$, all $p > 0.20$), suggesting that, as intended, the two groups were similar at the start of intervention.

Table 4 (from McCartney *et al.* 2009: 83) shows pre- and post-intervention results for the principal outcome language measures. Analyses of covariance with post-intervention scores as the dependent variable and pre-intervention score as covariate revealed that pre-test scores were significant covariates (all $F > 11$, 76, all $p < 0.001$) but no significant advantage for the cohort group relative to the RCT control group for either expressive language ($F < 1$, $p = 0.460$) or receptive language ($F = 2.861$, $p = 0.095$).

Table 3. Mean pre- and post-intervention scores for outcome measures

Outcome measure	Means (SD) pre-intervention scores	Means (SD) post-intervention scores
CELF-3^{UK} Expressive Language (SS)	69.89 (5.73) $n = 38$	72.06 (7.90) $n = 36$
CELF-3^{UK} Receptive Language (SS)	73.26 (7.79) $n = 38$	72.75 (7.63) $n = 36$
CELF-3^{UK} Total Language (SS)	69.32 (6.09) $n = 38$	70.22 (6.55) $n = 36$
WASI Non-Verbal IQ	87.32 (8.32) $n = 38$	N/A
PhAB Alliteration Test (SS)	84.08 (9.58) $n = 38$	86.28 (11.13) $n = 36$
PhAB Rhyme Test (SS)	84.76 (13.59) $n = 38$	85.00 (10.20) $n = 36$
PhAB Spoonerisms Test (SS)	87.14 (10.52) $n = 37$	84.74 (8.21) $n = 35$
PhAB Non-Word Reading Test (SS)	93.62 (13.77) $n = 37$	93.14 (11.70) $n = 35$
PhAB Naming Speed Test (pictures) (SS)	89.57 (13.92) $n = 37$	90.97 (14.30) $n = 36$
PhAB Naming Speed Test (digits) (SS)	90.62 (14.16) $n = 37$	88.60 (11.48) $n = 35$
PhAB Fluency Test (alliteration) (SS)	92.64 (13.52) $n = 36$	90.83 (15.41) $n = 35$
PhAB Fluency Test (rhyme) (SS)	93.94 (12.93) $n = 36$	92.86 (13.72) $n = 35$
PhAB Fluency Test (semantic) (SS)	97.33 (14.25) $n = 33$	97.06 (14.91) $n = 33$
NARA II Accuracy (SS)	81.93 (11.45) $n = 30$	80.77 (10.73) $n = 31$
NARA II Comprehension (SS)	82.93 (12.96) $n = 30$	82.42 (11.32) $n = 31$

Note: SD, standard deviation.

Table 4. Mean pre- and post-intervention scores for outcome measures for cohort and randomized controlled trial (RCT) historical control group: intention to treat analysis

	Mean pre-intervention scores (SD)		Mean post-intervention scores (SD)[a]	
Outcome measure (SS)	CELF-3^{UK} Receptive	CELF-3^{UK} Expressive	CELF-3^{UK} Receptive	CELF-3^{UK} Expressive
Cohort ($n = 38$)	73.26 (7.79)	69.89 (5.73)	72.75 (7.63)	72.06 (7.90)
RCT control group ($n = 31$)	76.00 (10.01)	70.16 (4.57)	77.03 (10.00)	70.84 (5.96)

Note:[a] Missing post-intervention scores for two pupils in the cohort were replaced by pre-intervention scores.

Conclusions and implications

The cohort study children fared as well as the control group in Boyle *et al.* (2007), who received their 'usual' level of speech and language therapy (SLT) services. However, the gains in expressive language made by children in that randomized controlled trial (RCT) who received around 22 hours of research intervention were not replicated.

Explanations for this must remain tentative. Children were selected for both studies using the same language and non-verbal criteria and pre-intervention scores showed no differences, suggesting very similar child populations were involved. The research SLT had been employed in both studies; and language-learning activities were drawn from the same therapy manual. It is possible that education staff could not use the language-learning activities effectively, but this was unlikely due to the qualified status of classroom and learning support teachers, and their well-managed classroom assistants, in the Scottish educational context.

Children with receptive difficulties were included in all comparison groups. Whilst their language-learning difficulties will have influenced and depressed outcomes, the fact that language levels in all comparison groups did not differ significantly at the start of intervention suggests receptive impairment was equally distributed and should not have affected progress differentially.

A more likely possibility is that the different outcomes might relate to different amounts of intervention and adherence to the therapy programme. Activity logs in the cohort study showed large differences amongst children, with some recording almost nine times as many contacts as others. Further, language-learning opportunities could have arisen in the classroom, but if so their impact was not sufficient to achieve outcomes comparable with the sustained and systematic language teaching that had been achieved in the RCT. The small numbers of children in the cohort study and the incomplete logs of language-learning activity prevent further analysis of the amount of language-learning activity and its relation to progress, and larger-scale studies of the optimal amount and pattern of language-learning activity for school-aged children would be welcome. Nonetheless, it is likely that cohort children on average undertook much less targeted language-learning activity than RCT research children

The amount of language intervention is therefore possibly a significant factor influencing child progress in these studies. As a group, RCT research intervention children recorded more systematic language intervention than three comparison populations: RCT control children, RCT children in the 1-year follow up period when project therapy had ended, and cohort study children. They also made more progress in expressive language. This suggests the current UK consultancy model, exemplified by 'usual therapy' delivered via local SLT services in the RCT and by the specific approach delivered by school staff in the cohort study, may offer low levels of language-learning activity, and (unsurprisingly) prove to be less efficacious in improving children's expressive language scores as some 20-plus hours of targeted input.

Many cohort study schools had difficulty in sustaining and recording language-learning activity, despite the carefully managed research context and the shared decision-making, and with learning support staff fully engaged. One immediate implication of these studies is that SLT and school services adopting a consultancy model require a careful activity audit to be undertaken. There is reason to be cautious about the likelihood of consistent and systematic language-learning activity being implemented by schools. There is a clear need for school and SLT services to agree expectations, and to spell out what will happen, and who will do what, and when. There is also a need to monitor the implementation within schools of such planned language interventions.

The consultancy approach as adopted in the cohort study may not fit particularly well into the ecology of the primary classroom in the UK, and finding time to undertake language-learning activities with individual children, or even with small groups, can present real difficulties for schools (McCartney *et al.* 2009). The predominance of consultancy models as identified in the Bercow Report (DCSF 2008) suggests that it is important to develop a more 'workable' indirect model for schools. The present authors have undertaken further research along these lines,[2] although outcomes of these new approaches have not been evaluated.

At the time of writing, however, the more efficacious therapy for children with persistent severe and persistent expressive language impairment (E-LI) remains an input that may be offered by SLTs or their assistants, and to children individually or in groups, but which is sustained for a considerably longer period than is routinely offered to children at present.

Acknowledgements

Q3 The RTC was funded by the National Co-ordinating Council for Health Technology Assessment (Project Number 99/36/04). A copy of the final report (Boyle *et al.* 2007) can be downloaded from the Q4 HTA website. The cohort study was funded by the Chief Scientist Office (Scotland) through the West of Scotland Research and Development Partnership (Project Number FV PC 56). The views expressed in this paper are those of the authors alone and not necessarily those of the funding bodies. **Declaration of interest:** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

Notes

1. Details of how the therapy manual was constructed and audited appear in McCartney *et al.* (2004); for the full manual, see: http://www.strath.ac.uk/media/departments/eps/docs/slt/tr/media_100682/.
2. Cf. their Language Support Model for Teachers at: http://www.strath.ac.uk/eps/courses/slt/lms.html; and McCartney *et al.* (2010).

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