An evaluation of speech and language therapy interventions for pre-school children with specific language impairment: A comparison of outcomes following specialist intensive, nursery-based and no intervention

Aoife Gallagher, Moor House School, Hurst Green, Oxted , Surrey RH8 9AQ

Email: gallaghera@moorhouseschool.co.uk

Direct Line: 01883 719054

Fax: 01883 716722

Shula Chiat, Department of Language and Communication Science, City University, Northampton Square, London EC1 0HB

Direct Line: 020-7040-8238

Fax: 020 7040 8577

Key Words:

Evidence based practice, language impairment, models of intervention, pre-school children, post-intervention outcomes, group therapy

Abstract

Background: Clinical services in the UK are increasingly delivering “consultative” methods of intervention rather than “direct” intensive input for children with receptive and expressive language difficulties, yet there has been little systematic evaluation of these different intervention models.

Aims: To investigate the effectiveness of different models of therapy provision for children with Specific Language Impairment between the ages of 4;00 and 4;06 years.

Methods & Procedures: Twenty-four children were selected from a specialist waiting list in the London Borough of Lambeth. They were assessed on a range of verbal and non-verbal skills, and randomly assigned to three different intervention groups. Group 1 received direct intensive speech and language therapy weekly over an eight-month period at a child development centre;Di Group 2 received a nursery-based model of intervention and Group 3 received review sessions at their local clinic.

Outcome & Results: Statistical analysis prior to the intervention phase revealed no significant differences in scores between the three groups on a range of clinical and parental measures of language, nonverbal skills, play and behaviour. At the end of the intervention period, the Intensive group showed significantly greater improvement than the No Intervention group on all clinical and parental measures, and significantly greater improvement than the Nursery-based group on all clinical and parental measures except for expressive grammar.

Conclusions & Implications:

The results of this small-scale study demonstrate that intensive direct speech and language therapy delivered by Speech and Language Therapists was a more

effective model of intervention for this clinical group with severe speech and language impairment.

Introduction

Despite the strategic promotion of “Evidence Based Practice” (EBP) within the UK since the early 90s, speech and language therapists do not routinely carry out research into the effectiveness of the services they provide. One of the many complex, contributory factors may be the methodological challenges involved in conducting a robust intervention study which are frequently reported in the literature (Eayers and Jones, 1992; Law, 1997; Roulstone, Glogowska, Enderby and Peters, 1999; Bishop and Leonard, 2000; Glogowska, 2001; Pring, 2004; Pring, 2005). Cultural reasons may also play a part. A sense of a hierarchy of evidence within the NHS, weighted towards quantitative research methodology, may also be an obstacle for therapists for whom qualitative methods often provide more useful data in informing clinical practice (Grimmer, 2004; Dodd, 2008; Joffe, 2008).

Methodological challenges can be identified at all stages of the research process. The requirement of “manualisation”, that is, the need to specify the procedures involved in the therapy to the degree to which it is clinically replicable (Caroll, 1998), may pose a conflict for those clinicians who believe that such rigidity undermines the fluid dynamic of the therapeutic process which makes it effective in the first place (Klein, 1998). Selection of appropriate and sensitive measures to evaluate intervention outcomes raises further issues. Standardised assessments have shortcomings as a sole measure (Weismer and Evans, 2002; Joffe, forthcoming), while informal assessments devised to be more closely linked to the therapy aims can be of questionable reliability. Gathering measurements across settings is generally agreed to be an important part of gaining a representative reflection of the child’s skills (Lahey, 1990; Leonard, 1998; Bishop, 1997), but budgetary constraints can often compromise this principle. The unreliability of using

a single measure or test has frequently been highlighted and whilst researchers advocate the use of multiple methods of assessment (Horton Laird and Zahner, 1999; Rutter and Pickles, 1990; Bishop, 1997; Pring, 2004; Pring, 2005), carrying out several types of assessment per child per target within the context of limited resources is not always realistic. The importance of including parents' perceptions in the evaluation of healthcare/intervention for their child is frequently highlighted (Fitzpatrick, 1991; Carr-Hill, 1992; Glogowska and Campbell, 2000). However, other non-specific factors such as amount of contact with professionals are likely to influence parents' perceptions of their child's clinical change (Eayers and Jones, 1992). Giving negative feedback with regard to perceptions of change as a result of therapy may be perceived to have implications in terms of continuing access to services.

While the multiple challenges outlined above have constrained practitioners in carrying out routine clinical evaluations, researchers have been carrying out investigations into the effectiveness of different speech and language therapy interventions for over thirty years. However, far from providing a clear picture, shifting definitions, terminology and criteria, the use of different measures and designs, and the lack of cited treatment effects make it difficult to compare results across these studies (Roulstone, Glogowska, Enderby and Peters, 1999; Pring, 2005).

Whilst a relatively large number of therapy studies have focused on comparing techniques such as modeling (Courtright and Courtright, 1976; Courtright and Courtright, 1979; Ellis Weismer and Murray-Branch, 1989; Leonard, 1975), imitation (Connell, 1987; Connell and Stone, 1992; Ezell and Goldstein, 1989) and conversational/sentence recasting (Camarata, Nelson and Camarata,

1994; Nelson, Camarata, Welsh, Butkovsky and Camarata, 1996; Saxton, 2005; Fey, Cleave and Long, 1997), fewer studies have investigated the effectiveness of different models of therapy provision. Early studies carried out by Cooper, Moodley and Reynell (1979) investigated the effectiveness of a therapy programme which parents/carers carried out at home, comparing gains in language scores with those of a group for whom the programme was delivered directly by a SLT in a language group. They demonstrated that the home-based intervention delivered by the parents was more effective. Ward (1994) showed that working with children as young as one year of age through parents/carers can result in significant gains for these children. Best, Melvin and Williams (1993) carried out a study of the effectiveness of intervention in day nurseries for children with language, communication and/or behavioural difficulties. Participants were randomly allocated either to a communication group which received nursery-based intervention or to a control group which received no intervention. The children in the communication groups received twice weekly group sessions for 40 minutes per session for an average of 18 sessions. These children showed significantly greater improvements on measures of concept development, and in the number and quality of their interactions, compared with the control group. Gibbard (1994) compared language gains in a group receiving direct individual intervention delivered by a SLT with indirect group input delivered by parents, and with a no intervention “placebo” group. The results showed greater gains in expressive language for the two treatment groups compared with the no intervention group. However, there were no significant differences between the direct individual intervention and the consultative intervention group on language measures. The conclusion drawn from this study was that consultative and direct interventions were equally effective for

this group of pre-school children in the area of expressive language. Barratt, Littlejohns and Thompson (1992) studied a group of children who were allocated to three intervention groups differing in intensity. This study concluded that greater gains in expressive language were achieved as a result of the more intensive package.

A large-scale meta-analysis of studies of the effectiveness of early intervention was carried out by Casto and White (1985) who concluded that early intervention programmes showed positive effects on language measures. More recently, a large-scale intervention study carried out by Glogowska et al. (2000) aimed to evaluate the effectiveness of speech and language services for pre-school children across 16 clinics in Bristol. The study used an RCT design with a large sample size of 159 pre-school children, and compared progress made by children who received therapy to those who did not receive active intervention ("watchful waiting") over a period of 12 months. No significant differences were found between scores of the children who received therapy and the no intervention group on four of the five measures used. This led the researchers to conclude that speech and language therapy is not effective for pre-school children and to recommend that service providers need to reconsider providing therapy to these children with speech and language difficulties. Pring (2004) points out some limitations of this study, including the broad entry criteria of the study, the minimal amount of therapy actually received (an average of 6 hours over the 12 month period), and the sensitivity of the measures used in relation to therapy goals. Furthermore, the study did not specifically describe the type or focus of the therapy delivered, making it difficult to compare the results with those of other intervention studies for pre-school children.

A meta-analysis originally carried out by Law (2003) and recently updated (Law, under review) states that speech and language intervention shows positive outcomes for children with phonological difficulties and those with low expressive vocabulary scores. It also suggests positive intervention outcomes for children with impaired expressive syntax in the absence of additional comprehension difficulties. However, it states that there continues to be a considerable gap in our knowledge of the effectiveness of intervention for children with comprehension difficulties.

With such a small body of clinical research investigating the effectiveness of different therapy interventions, it is not surprising that decisions with regard to therapy services for particular clinical groups such as pre-school children with SLI are, for the most part, driven by political and/or financial factors rather than research evidence. Just as for other clinically specific groups, specialist services for children and young people with SLI are shifting away from “direct” intervention delivered by qualified speech and language therapists towards more “consultative” approaches to treatment. These approaches are characterised by some joint working with a speech and language therapist, and an assumption that the treatment will be “carried over” by the staff in the client’s daily environment. It was such a shift in service provision that provided the context for the present study. Immediately prior to the study, resources were diverted from the specialist services for pre-school children with SLI in Lambeth PCT. As a result, two concurrent weekly intensive groups (with a total of 16 children) were reduced to one, and children on the waiting list for the specialist services had to be transferred back to the core services for therapy. These changes to the service allowed a rare opportunity to compare the effectiveness of the 'intensive' and 'core' models of service for matched groups of children with SLI, all with severe difficulties (differentiating them

from participants in most other intervention studies). While withholding treatment from some children raises ethical considerations, the groupings in this study arose from the service changes which reduced specialist provision for children equally in need of this. The study received ethical approval from the Guy's and St Thomas' Research Ethics Committee.

Taking into account previous studies, and the severity of the children's impairment, this intervention study had two main hypotheses: that children with SLI who received a direct, intensive speech and language therapy intervention would make significantly greater improvement in understanding and use of language, as measured by clinical assessments and parental questionnaires, than children who received a more consultative, nursery-based intervention; in contrast, children who received nursery-based intervention would not differ from those who received no intervention.

Method

Design

In order to investigate the effectiveness of different therapy packages, children meeting the criteria for participation were randomly assigned to one of three intervention groups. A set of baseline assessments were carried out prior to intervention and repeated post intervention. Effectiveness of interventions was evaluated by comparing differences in scores pre and post intervention across the three groups.

Participants

The participants for this study were recruited from a specialist waiting list of pre-school children aged between 3;6 and 5;0 years and living in the Borough of Lambeth. Children were routinely referred by their local speech and language

therapist and community paediatrician to this service and accepted onto this waiting list if they demonstrated a discrepancy between verbal and non-verbal skills and did not have a history of neurological impairment. Children diagnosed with autistic spectrum disorders, attention deficit disorder or emotional behavioural difficulties were not accepted onto this waiting list. The children were also required to have a delay of 1;6 years or more on comprehension and/or expressive language scores.

The criteria for participation in the study drew on a combination of those specified by the World Health Organisation (WHO, 1992) and the American Psychiatric Association's Diagnostic and Statistical Manual (DSM-1V, 1994) in defining Specific Language Impairment. These required language scores below -2SDs, non verbal IQ within normal range, no history of hearing impairment, no frank neurological damage, no significant emotional behavioural difficulties, no diagnosis of ASD and/or no history of concerns regarding autistic spectrum type difficulties from parents/professionals. An additional criterion for the study involved parental reports of a significant impact of language impairment on the child's daily life/learning/socialisation.

Of the 36 children on the waiting list whose parents had given consent to participate, the total number that met the criteria for the study was 24. All participants were attending a nursery class or nursery school, either morning or afternoon, five days a week. All had English as a "primary" language as reported by parents/carers. The sample comprised 18 boys and 6 girls aged between 43 and 50 months (mean age=46.75). Table 1 provides information on family, socio-economic and cultural background of the participants.

INSERT TABLE 1

The 24 participants were randomly assigned to the three intervention groups

(n=8 per group). Comparison of groups on baseline assessments showed no significant differences on any of the measures (see Results). It could therefore be assumed that any changes post intervention were not due to differences between the groups prior to treatment.

Procedures

Baseline assessments

Baseline assessments included measures of comprehension of grammar and vocabulary, as well as expressive grammar, information and vocabulary. The Reynell Developmental Scales III comprehension subtest was used to assess understanding of grammar (Reynell, 1997). This standardised assessment, which tests language development, has two separate scales, one for expression and one for comprehension, and is suitable for ages 15 months to seven years and six months. The British Picture Vocabulary Scales (BPVS) was used to assess understanding of vocabulary (Dunn et al., 1997). This is a standardised test of vocabulary comprehension which requires the child to point to one of four pictures named by the tester. The Renfrew Action Picture Test (RAPT) was used to assess expressive language (Renfrew, 1997). This test requires children to describe a set of pictures, and responses are scored for information and for grammar. It is standardised for ages 3-8 years, and yields age-equivalent scores. The Renfrew Word Finding Test (RWFT) was carried out to assess expressive vocabulary (Renfrew, 1988). This test assesses children's ability to name pictures of objects arranged in order of difficulty. It is suitable for the age range of 3-9 years, and again yields age-equivalent scores.

Baseline assessment also included a measure of non-verbal skills using the subtests "block design" and "picture completion" of the Wechsler Pre-school and

Primary Scale of Intelligence (WPPSI-R UK; Wechsler, 1992). To ensure the children had similar levels of attention and listening, different types of measures were used. The Connors Parent Rating Scales (Connors 1997) was administered to gain insight from the parent/carer's perspective of the child's attention skills. A subtest from the NEPSY (Korkman, Kirk and Kemp 1998) was used to assess motor inhibition, i.e. the ability of the child to be able to ignore auditory distractions. In the absence of any standardised tests of the children's sustained ability to attend to language, a subtest of the TEA-Ch Test of Everyday Attention for Children (Manly, Robertson, Anderson and Nimmo-Smith, 1999), standardised for older children, was adapted locally for use with younger children.

A short questionnaire was devised to gather parent/carer perceptions of the child's skills before and after the intervention (Appendix 1). This questionnaire included a series of statements about the child which focused on difficulties in the areas of language skills, attention skills, emotional behavioural issues and play skills. The parent/carer had to estimate how accurately they felt the statements described their child on a scale of one to three. It was therefore possible to calculate an overall rating of severity for each of these areas. A further section of the questionnaire was designed to gather perceptions of the impact of the difficulties on the child's family, home life, friendships, learning and leisure activities on a scale of one to four. In both sections of the questionnaire, the higher the number scored, the more severe the difficulties.

Baseline assessments were in most cases carried out over two consecutive sessions at a child development centre within a timescale of two weeks. A small proportion of the children needed a further session in order to complete the battery of assessments due to attention difficulties. The parent/carer was present for all

assessment sessions. The parents filled in the questionnaires while the SLT carried out the clinical tests with the child. Several comfort breaks and play activities were included in the sessions to ensure the children remained motivated to complete tests.

Treatment

Models of intervention

The models of intervention being evaluated were those being delivered by the Lambeth Primary Care Trust Speech and Language Therapy service at the time of the study. Group 1 received a “direct”, intensive group intervention. This intervention was delivered by two speech and language therapists at a child development centre in one weekly session lasting for four consecutive hours. The therapy sessions ran for a total of 24 weeks. These sessions were spread over the normal school calendar with breaks between the Autumn and Spring terms. The total number of therapy hours in this package was 96. It is important to note that this group included only participants in the study, so all children met the criteria for participation.

Group 2 received a more consultative package combining direct and indirect group intervention. This intervention involved group sessions delivered weekly by a speech and language therapist and a member of staff at the children’s nurseries. Each of these therapy sessions lasted one hour. The group sessions were delivered in six-week blocks in the first half of the autumn term and in the first half of the spring term. The model involved a speech and language therapist supporting nursery staff in carrying out therapy activities through the jointly run sessions. During the half term when the speech and language therapist was not providing direct therapy, staff continued to carry out therapy activities. Training workshops

are offered to nursery staff as part of the nursery-based package. However, no training was requested in the course of this study. The total number of hours of therapy in which the speech and language therapist was directly involved was 12. As stated previously, the children in this treatment group received this intervention in their individual nursery, and therefore alongside other children with language impairment of varying degrees. The groups in which these children received therapy had a range of clinical needs.

The speech and language therapists delivering this intervention completed a questionnaire at the end of the therapy phase. The aims of this questionnaire were to quantify the hours of therapy delivered and monitor the procedures used in therapy sessions. The questionnaire was also important in allowing an estimation of how frequently nursery staff carried out activities in the nursery-based intervention.

Group 3 were placed on the waiting list at their local clinic. Over the course of the study, the children in this group did not receive any appointments or received one review appointment and advice to parents/carers. This group of children therefore received no direct intervention from a speech and language therapist.

Therapy aims

Both treatment groups shared the same therapy aims focusing on the following areas of language:

a) Understanding and use of linguistic concepts such as colour, size, spatial prepositions.
b) Understanding and use of grammatical markers e.g. past *-ed* endings, plural *-s*.
c) Understanding and use of utterances including increasing numbers of key information words.

d) Understanding and use of a list of topic-based vocabulary.

e) Attention to adult-led tasks for an increasing length of time.

A series of individual targets were set for each child every term based on the "East Kent Outcome Measures" system (Johnson and Elias, 2002). Each child had a target which related to the measures in the study.

Therapy techniques

The therapy techniques used in the treatment phase included modeling, sentence recasting and elicited imitation. In tasks where modeling techniques were used, the speech and language therapist produced models of target utterances which were repeated several times using a variety of visual stimuli, starting with picture sequences in books, and moving on to 'social stories' using miniatures. Activities were divided into "listening" and "talking" tasks. The child was not requested to repeat the model until the "talking" part of the task, which used the same visual support systems.

In tasks involving the technique of sentence recasting, the speech and language therapist produced correct models of utterances that the children had initiated. No demands were placed on the child to repeat the correct utterance. It was assumed that the proximity of the adult model to the child's would result in the child re-analysing the utterance and eventually incorporating the new structure or word or grammatical ending into their language system. In elicited imitation, the speech and language therapist modelled an utterance related to a visual stimulus and requested that the child repeat the utterance. This technique was used in the group situation, asking children to give instructions to other children or to miniature dolls/puppets in order to reduce the speaking pressure of the technique.

Procedure of therapy group sessions

The sequence of activities followed by the treatment groups is outlined in Appendix 2. Plans and resources were created for the therapists delivering the sessions. There were differences in how the treatments were delivered due to time constraints for the Nursery-based group. Activities 4 and 6 were not carried out as part of these group therapy sessions and the groups differed in how activity 3 was delivered in terms of therapy approaches.

Activities were prioritised for the nursery-based treatment through consultation with the staff at the different nurseries who were asked which activities would be easiest. Sentence recasting techniques were used throughout the nursery-based sessions by the SLT on hearing incorrect grammatical utterances from the children.

Parental involvement in group interventions

Parents/carers were invited to observe a session of therapy either at their child's nursery or at the child development centre, and were given short homework tasks at the end of each session to complete for the following session. On average, parents observed one session per term.

Post-intervention assessments

At the end of the intervention period, speech and language therapists from a different part of the service and blind to group status re-administered the assessments of comprehension of grammar and vocabulary as well as the expressive language tests. All of the post-intervention assessments were carried out at the child development centre. The parents completed the same questionnaires as they had prior to the intervention phase. In addition, a questionnaire was completed by the speech and language therapists who delivered the treatment (Appendix 3). This questionnaire gathered data on each child in the

study such as attendance rate and number of sessions observed by the parents as well as information with regard to how the sessions were actually delivered. The speech and language therapists who delivered the nursery-based intervention completed further questions asking them to estimate carry-over of strategies by nursery staff within the nursery environment outside of the group and to indicate whether staff had received any additional training during the experimental phase of the study.

Attendance rates

The majority of the children in both the Intensive and the Nursery-based groups attended all sessions. Two of the eight children in the Intensive group missed one session, and one child in the Nursery-based group missed two sessions.

Results

Baseline performance

Table 2 presents baseline mean scores and standard deviations for each group on performance IQ, attention tasks, all language tests, and parent/carer questionnaires.

INSERT TABLE 2

A one-way ANOVA was carried out to compare performance of the three groups prior to intervention. No significant differences were identified between any groups on comprehension of grammar, comprehension of vocabulary, expressive grammar, expressive information or expressive vocabulary. Similarly, the parent/carer questionnaires revealed no significant differences between any groups on language scores, attention and listening scores, emotional behavioural scores, play scores and impact scores ($p>.05$ in all cases).

Post-intervention results

Table 3 presents the mean scores, standard deviations and ranges for the three groups on all measures post intervention.

INSERT TABLE 3

The boxplots in Figures a-e show the spread of scores for each of the three groups on the standardised measures post intervention. These illustrate the differences in group outcomes which are apparent in Table 3, and are described and analysed below.

INSERT FIGURES 1 a-e

Each child's progress following intervention was measured by calculating differences between the child's scores at baseline and post intervention. Independent t tests were used to compare progress across the three groups for each of the clinical and parental measures. Treatment effects were also calculated for each group. The results of these t tests and treatment effects are presented first for the Intensive versus Nursery-based groups, then for the Intensive versus No Intervention groups, and finally, for the Nursery-based versus No Intervention groups.

Intensive group versus Nursery-based group

The Intensive group and the Nursery-based group showed significant differences in progress on comprehension of grammar ($t=5.062$, $df=14$, $p<.01$), comprehension of vocabulary ($t=7.401$, $df=14$, $p<.01$), expressive vocabulary ($t=3.211$, $df=14$, $p<.01$) and expressive information ($t=3.473$, $df=14$, $p<.01$). Examination of the mean scores revealed that children in the Intensive group made more progress on each of these measures than those who received the nursery-based intervention. However, the two groups did not show significant differences on expressive

grammar (t=1.696, df=14, p>.05).

Treatment effects were calculated for each clinical measure. The Intensive group showed consistently larger treatment effects than the Nursery-based group. The Intensive group showed large effects for all areas of language treated: comprehension of grammar (d=1.72), comprehension of vocabulary (d=2.24), expressive information (d=1.52), expressive vocabulary (d=2.76), and expressive grammar (d=1.26). In contrast, the Nursery-based group showed relatively small treatment effects on comprehension of grammar (d=.45), comprehension of vocabulary (d=.34), expressive information (d=.06), and expressive grammar (d=.63), with a larger effect only on expressive vocabulary (d=1.6).

Analysis of the difference between baseline and post-intervention scores on parent questionnaires across the Intensive versus Nursery-based groups showed no significant differences on language scores, attention and listening, play or emotional behavioural scores. However, significant differences were identified on impact scores (t=3.168, df=14, p< .01).

Intensive group versus No Intervention group

The Intensive group and the No Intervention group showed significant differences in progress on all language measures including comprehension of grammar (t=8.195, df=14, p<.01), comprehension of vocabulary (t=7.035, df=14, p<.01), expressive grammar (t=3.391, df=14, p<.01), expressive vocabulary (t=3.425, df=14, p<.01), and expressive information (t=3.391, df=14, p<.01). Examination of the mean scores revealed that children who received the Intensive group intervention made more progress than those who did not receive any intervention.

Analysis of the difference between baseline and post-intervention scores on parent questionnaires across the Intensive versus No Intervention groups showed

no significant differences on language scores or emotional behavioural scores. However, significant differences were identified between the Intensive and No Intervention groups on attention scores (t=3.375, df=14, p<.01), play scores (t=2.198, df=14, p<.05) and impact scores (t=6.581, df=14, p<.01), with the children in the Intensive group making more progress than the children in the No Intervention group on these measures.

Nursery-based group versus No Intervention group

The Nursery-based group and the No Intervention group showed significant differences in progress on comprehension of grammar (t=2.559, df=14, p<.05), with the children who received the nursery-based intervention making more progress. However, comparison of the Nursery-based group and the No Intervention group showed no significant differences on comprehension of vocabulary, expressive grammar, expressive language and expressive vocabulary. Analysis of post-intervention parent questionnaires for the Nursery-based and the No Intervention groups showed significant differences on impact scores (t=3.656, df=14 p<.01), with the children who received the Nursery-based group intervention making more progress on this measure than the children in the No Intervention group.

Results from speech and language therapists' questionnaires

A total of 10 questionnaires were completed and analysed.

Intensive group

Both of the speech and language therapists who delivered the intensive intervention completed the questionnaire. The therapy received by the children in this group ranged from 90 to 96 hours. The aims of therapy were as planned at the beginning of the intervention phase, and activities 1-8 described in the previous section were carried out consistently as described in Appendix 3. The speech and

language therapists did not identify any external, additional factors that may have influenced the therapy outcome.

Nursery-based group

All of the eight speech and language therapists who delivered the nursery-based intervention completed and returned the questionnaire. The therapy received by the children in this group was estimated to be between 8 and 11 hours. The aims of therapy were as planned at the beginning of the intervention phase, and activities 1, 2, 3, 5, 7 and 8 as described in Appendix 3 were carried out at each session. The speech and language therapists identified a range of external factors that may have influenced the therapy outcome. These included issues related to the nature of the organised day in the nursery settings. Six out of the eight speech and language therapists reported working with a different staff member each week. One therapist reported that only one session out of the twelve was delivered jointly with a member of staff. One therapist commented that time spent negotiating access to a protected working space reduced the length of the group session.

No Intervention group

Speech and language therapists' questionnaires confirmed that this group did not receive any direct intervention. Seven out of the eight children received a review appointment during the intervention phase of the study.

Discussion

This intervention study had two main hypotheses: that children with SLI who received intensive speech and language therapy intervention would make significantly greater improvement in understanding and use of language, as measured by clinical assessments and parental questionnaires, than children who received a less intensive nursery-based intervention; in contrast, children who

received a less intensive nursery-based intervention would not differ from those who received no intervention. Comparison of results across the treatment packages and with previous studies allows some tentative inferences to be made.

Hypothesis 1: Intensive versus other groups

In line with the first hypothesis, the children who received the intensive intervention made significantly more progress in understanding of grammar and expressive information than the children in the other experimental conditions. The treatment effects further support the hypothesis. The Intensive group showed a large treatment effect (d=1.72) for understanding of grammar and the Nursery-based group a considerably smaller effect (d=.45). Treatment effects for expressive language intervention for the Intensive group also showed a large effect (d=1.52), with the Nursery-based group showing a much smaller effect (d=.06). The same pattern of results is apparent for receptive and expressive vocabulary. The Intensive group showed significant differences compared to the other experimental groups, along with large treatment effects, for both comprehension of vocabulary (d=2.24) and expressive vocabulary (d=2.76). In contrast, the two treatment groups did not differ significantly on expressive grammar scores post intervention. Interestingly, though, the Intensive group showed a much larger effect (d= 1.26) than the Nursery-based group (d=.33), and unlike the Nursery-based group, did show significantly greater progress than the No Intervention group.

The positive outcomes on vocabulary are consistent with the outcomes of expressive vocabulary intervention studies cited in the meta-analysis of intervention studies conducted by Law et al. (2003, under review). However, other gains and treatment effects observed for the Intensive group contrast with previous findings on intervention for children with receptive difficulties reported by Law, who

concludes that there is very little evidence that speech and language therapy is effective for children with receptive impairments. The finding that intervention was effective for children with receptive language difficulties who received the intensive intervention model in the present study suggests that intensity of intervention may be a key issue for these children.

The intensive intervention differed from the nursery-based intervention in a number of respects. The most striking was dosage. The intensive intervention focused on understanding of grammar tasks for an average of one hour out of the weekly four-hour session over the twenty-four weeks of therapy (a total of 24 hours), whereas the Nursery-based group received an estimated fifteen minutes of the hour-long session per week focused on this area (a total of 3 hours). Similarly, the children in the Intensive group received a total of 24 hours of therapy on expressive language, compared with the Nursery-based group total of three hours. Turning to vocabulary, the Intensive group received a total of 12 hours of therapy over the course of the study compared with the Nursery-based group total of three hours. These substantial differences in dosage could account for the different outcomes of the specialist intensive and nursery-based interventions.

However, the two interventions also differed to some extent in the range of techniques employed (see Appendix 3), and the experience of clinicians delivering these. Furthermore, only the children in the Intensive group received intervention at the children's development centres where all the assessments were conducted. Any of these differences may have influenced the rate of gain in the Intensive group relative to the Nursery-based group, and relative to groups in other studies where these differed in similar respects. Further investigation would be needed to tease

apart the contribution of dosage, techniques, relative expertise of clinicians, and children's familiarity with the assessment centre.

The finding that the Intensive group did not show significantly greater improvement on expressive grammar scores is in line with Boyle (2006, cited in Law under review) who found no differences in effectiveness of interventions when comparing outcomes for expressive grammar as a result of direct group and individual intervention delivered by a speech and language therapist, and intervention delivered indirectly through an assistant. Nevertheless, the larger treatment effects in the Intensive group observed in the present study open up the possibility that more intensive intervention may benefit even this most challenging of intervention targets.

Results from parent/carer questionnaires indicate whether the changes identified on clinical measures generalised to the children's everyday lives. The questionnaires support the first hypothesis on measures of attention and listening skills, play scores and "impact" scores, all of which showed significant differences between the treatment groups. As expected, no significant differences were identified between the intervention groups in emotional/behavioural skills. As neither treatment group focussed directly on this area in the therapy sessions, the results are perhaps unsurprising. Nevertheless, the scores do show some small non significant differences across the three groups, with 25% of the parents/carers of the children who received intensive intervention reporting improvements in behaviour following the intervention period, in comparison to 12% of the Nursery-based group, and 0% of the No Intervention group.

Contrary to the first hypothesis, no significant differences were identified between the treatment groups in parent/carer ratings of changes in language skills

pre and post intervention. However, the questionnaires did show non significant differences in the same direction as the assessments: 62.5% of the parents/carers of the children who received the intensive intervention package reported improvements in language skills, as did 50% of the parents/carers of the children in the Nursery-based group. In contrast, 50% of the parents/carers of the No Intervention group rated no improvement, with the remaining 50% reporting an increase in their child's language difficulties.

Hypothesis 2: Nursery-based versus No Intervention groups

The second hypothesis of the study predicted that the Nursery-based group would not make more progress on clinical language scores and parent/carer perceptions of change than the No Intervention group. Many of the results support this hypothesis. No significant differences were identified on the clinical measures of expressive language, expressive grammar, expressive vocabulary and understanding of vocabulary. Nor were any significant differences observed on parent/carer ratings of attention and listening skills, play skills, language skills, and emotional/behaviour scores. Contrary to the second hypothesis, significant differences were identified between the Nursery-based and the No Intervention groups on comprehension of grammar, though the treatment effect is small (d= .45). Given the minimal changes observed on clinical measures, the significant changes in "impact" scores as rated by the parents/carers for the Nursery-based group are perhaps surprising. As these parents/carers had regular weekly contact with the speech and language therapist compared with the No Intervention group who met their therapist once during the intervention phase of the study, this may have been a factor in the parent/carer perceptions of change.

The finding that the Nursery-based group showed very few differences from the No Intervention group contrasts with the positive effects of nursery-based intervention reported by Best et al. (1993). They found that children participating in communication groups showed significantly greater improvement on measures of concept development, and interaction and engagement, than a control group receiving no intervention. However, Best et al.'s study differed from the present study in many respects, including selection criteria, pre- and post-intervention assessments, intervention techniques, and dosage. Any or all of these could account for the different results. For example, the deficits of the children in the Best et al. study were less severe than the deficits of the children in the present study, who scored at least 2SDs below the mean for their age. Comparison with the Gibbard (1994) study is similarly problematic as there were differences between the studies in the ages of the cohort, and more importantly, the criteria for participation in the Gibbard study did not include comprehension difficulties. It is very likely therefore that the clinical profiles of the cohorts differed. The lack of positive effects of the nursery-based intervention in the present study is in line with the results of intervention for children with receptive language difficulties reported by Law et al. (2003, under review). It might be tentatively concluded that children with severe receptive as well as expressive language difficulties require more intensive, direct intervention of the sort delivered in this study, though further investigations are needed to corroborate this conclusion, and to determine the dosage and techniques which are critical for this group.

Limitations and challenges

As with any intervention study, it is extremely difficult to trace causal links between interventions and outcomes. In this study, the Intensive and Nursery-

based groups differed in dosage, range of intervention techniques, level of SLT expertise, and physical environment. Any of these factors may contribute to differences in outcome. It is difficult to separate out and investigate each of these factors in real clinical conditions, as opposed to optimal ‘laboratory’ conditions. It would be possible to investigate whether a higher dosage of the consultative, nursery-based intervention might result in improvements in language skills matching the improvements observed in the children who received the more intensive intervention. It would also be possible to investigate the effects of smaller 'doses' of the intensive intervention with a view to ascertaining a critical dosage point. These issues certainly merit investigation. However, some factors, such as level of expertise of the individual SLTs carrying out the intervention, are less easy to separate out. It is generally the case that “specialist” services are delivered by SLTs with more clinical experience than “core” services.

The multiplicity of factors involved in intervention also makes it difficult to compare findings across different intervention studies. This is well illustrated by the discussion of Best et al. (1993) above. Differences in selection criteria, measures used, and intervention techniques, as well as dosage, precluded meaningful comparison of Best et al.'s results with the results of the present study.

Another major challenge for intervention studies is to provide sufficient specification of the intervention, particularly for consultative models of intervention. In the present study, it was not possible to specify the “indirect” input delivered by nursery staff in the Nursery-based group as demands on the service prevented direct monitoring of how frequently the nursery staff carried out these therapy activities.

Conclusions and recommendations

This study demonstrated that direct intensive speech and language therapy group intervention was effective in improving expressive and receptive language skills, attention and listening, and play skills in a group of pre-school children with severe SLI (scoring below -2SDs on language measures). It also demonstrated that a more consultative nursery-based intervention package was not effective in improving these skills. The study therefore supports the view that services need to be differentiated for this clinical group of children who have significant language impairments. The sample in this study was small and the criterion for selecting children with SLI was lower than that used in most studies of SLI. Findings therefore cannot be generalised to the SLI population. However, the results go some way to adding to the local evidence base for the provision of services to pre-school children with similar clinical profiles in Lambeth PCT, and add to the evidence base on intervention for pre-school children with severe language impairment.

References

American Psychiatric Association. 1994, *Diagnostic and Statistical Manual of Mental Disorders - 4th Edition*. Washington DC, American Psychiatric Association.

Barratt, J., Littlejohns, P. and Thompson, J. 1992, Trial of intensive compared with weekly speech therapy in pre-school children. *Archives of Disease in Childhood* **67**, 106-108.

Best, W., Melvin, D., Williams, S., 1993, The effectiveness of communication groups in day nurseries. *European Journal of Disorders of Communication* **28**, 187-213.

Bishop, D.V.M., 1997, *Uncommon understanding*. Hove, UK, Psychology Press.

Bishop, D.V.M. & Leonard, L.B. (Eds.), 2000, *Speech and language impairments in children: causes, characteristics, intervention and outcome*. Hove, UK: Psychology Press.

Camarata S.M., Nelson K.E. and Camarata M.N., 1994, Comparison of conversational recasting and imitative procedures for training grammatical structures in children with specific language impairment. *Journal of Speech and Hearing Research* **37**, 1414-1423.

Carr-Hill, R.A., 1992, The measurement of patient satisfaction. *Journal of Public Health Medicine* **14**, 236-249.

Carroll, K.M., 1998, Manual guided psychosocial treatment, A new virtual requirement for pharmacotherapy trials? *Archives of General Psychiatry* **54**, 923-928.

Casto, G. and White, K.R., 1985, The efficacy of early intervention program with environmentally at–risk infants. *Journal of Children in Contemporary Society* **17**, 37-50.

Charman, T., Baron-Cohen, S., Swettenham, J., Baird, G., Cox, A. and Drew, A., 2000, Testing joint attention, imitation and play as infancy precursors to language and theory of mind. *Cognitive Development* **15**, 481-498.

Connell, P.J., 1987, An effect of modeling and imitation teaching procedures on children with and without specific language impairment. *Journal of Speech and Hearing Research* **30**, 105-113.

Connell, P.J. and Stone, C.A., 1992, Morpheme learning of children with specific language impairment under controlled instructional conditions. *Journal of Speech and Hearing Research* **35**, 844-852.

Connors, C.K., 1997, *Connors' Parent Rating Scale – Revised CPRS-R.* UK, Multi Health Systems Inc.

Cooper, J., Moodley, M., and Reynell, J.,1979, The developmental language programme: Results from a five year study. *British Journal of Disorders of Communication* **14**, 57-69.

Courtright, J. and Courtright, I., 1976, Imitative modeling as a theoretical base for instructing language disordered children. *Journal of Speech and Hearing Research* **19**, 655-663.

Courtright, J. and Courtright, I., 1979, Imitative modeling as a language intervention strategy. The effects of two language mediating variables. *Journal of Speech and Hearing Research* **22**, 389-402.

Dodd, B., 2008, Speech-Language Therapy and evidence-based practice. In V. Joffe, M. Cruice, & S. Chiat (Eds.), *Language Disorders in Children and Adults: Key Issues in Research and Practice*. Chichester, West Sussex: John Wiley.

Dunn, L.L., Dunn, L.L., Whetton, C. and Burley, J., 1997, *British Picture Vocabulary Scales - 2nd edition*. Windsor: NFER-Nelson.

Eayers, C.P. and Jones, R.B., 1992, Methodological issues and further directions in the evaluation of early intervention programs. *Child: Care, Health and Development* **18**, 15-28.

Ellis Weismer, S. and Murray-Branch, J., 1989, Modeling versus modeling plus evoked production training: A comparison of two language intervention methods. *Journal of Speech and Hearing Research* **54**, 269-281.

Ezell, H.K. and Goldstein, H., 1989, Effects of imitation on language comprehension and transfer to production in children with mental retardation. *Journal of Speech and Hearing Research* **54**, 49-56.

Fey, M.E., Cleave, P.L., and Long, S.H., 1997, Two models of grammar facilitation in children with language impairments: Phase 2. *Journal of Speech, Hearing and Language Research* **40**, 5-19.

Fitzpatrick, R., 1991, Surveys of patient satisfaction: Important general considerations. *British Medical Journal* **318**, 186-188.

Gibbard, D., 1994, Parental-based intervention with pre-school language delayed children. *European Journal of Disorders of Communication* **29**, 131-150.

Glogowska, M., 2001, RCTs: Myths, misconceptions and mastery. *RCSLT Bulletin*.

Glogowska, M. and Campbell, R., 2000, Investigating parental views of involvement in pre-school speech and language therapy. *International Journal of Language and Communication Disorders* **35**, 391-405.

Glogowska M., Roulstone S., Enderby P. and Peters, T.J., 2000, Randomised controlled trial of community based speech and language therapy in pre-school children. *British Medical Journal* **321**, 923-926.

Grimmer, K., Bialocerkowski, A., Kumar, S. and Milanese, S., 2004, Implementing evidence in clinical practice: The therapies dilemma. *Physiotherapy* **90**, 189-194.

Hill, E., 2001, Non-specific nature of specific language impairment: A review of the literature with regard to concomitant motor impairment. *International Journal of Language and Communication Disorders* **36**, 149-171.

Horton, N.J., Laird, N.M. and Zahner, G.E.P., 1999, The use of multiple informant data as a predictor in psychiatric epidemiology. *International Journal of Methods in Psychiatric Research* **8**, 6-18.

Joffe, V, 2008, Minding the gap between research and practice in developmental language disorders. In V. Joffe, M. Cruice, & S. Chiat (Eds.), *Language Disorders in Children and Adults: Key Issues in Research and Practice*. Chichester, West Sussex: John Wiley.

Johnson, M. and Elias, A., 2002, *East Kent Outcome System for Speech and Language Therapy*. East Kent Coastal Primary Care Trust.

Klein, D.F., 1998, A psychotherapeutic context for clinical trials is promising, but manualisation is not. *Archives of General Psychiatry* **54**, 929-930.

Korkman, M., Kirk, U. and Kemp, S., 1998, *NEPSY*. San Antonio, TX: Psychological Corporation.

Lahey, M., 1990, Who shall be called language disordered? Some reflections and perspectives. *Journal of Speech and Hearing Disorders* **55**, 612-620.

Law, J., 1997, Evaluating intervention for language impaired children: A review of the literature. *European Journal of Disorders of Communication* **32**, 1-14.

Law, J., under review, Speech and language therapy interventions for children with primary speech and language delay or disorder (Cochrane Review).

Law, J., Garrett, Z., & Nye, C., 2003, Speech and language therapy interventions for children with primary speech and language delay or disorder (Cochrane Review). In: The Cochrane Library, Issue 3, Oxford: Update Software.

Leonard, L.B., 1998, *Children with specific language impairment*. Cambridge, MA: MIT Press.

Leonard, L., 1975, Modeling as a clinical procedure in language training. *Language, Speech and Hearing Services in Schools* **6**, 72-85.

Manly, T., Robertson, I.H., Anderson, V. and Nimmo-Smith, I., 1999, *The Test of Everyday Attention for Children*. Bury St. Edmunds, Suffolk: Thames Valley Test Company.

Nelson, K.E., Camarata, S.M., Welsh, J., Butkovsky, L. and Camarata, M., 1996, Effects of imitative and conversational recasting treatment on the acquisition of grammar in children with specific language impairment and younger language-normal children. *Journal of Speech and Hearing Research* **39**, 850-859.

Pring, T., 2004, Ask a silly question: Two decades of troublesome trials. *International Journal of Language and Communication Disorders* **39**, 285-302.

Pring, T., 2005, *Research methods in communication disorders*. London: Whurr.

Renfrew, C., 1988, *Word Finding Vocabulary Scale – 3rd edition*. Oxford: C.E. Renfrew.

Renfrew, C., 1997, *Action Picture Test - 4th edition*. Bicester: Winslow Press.

Reynell, J. and Huntley, M., 1997, *The Reynell Developmental Scales III - Revised*. Windsor: NFER-Nelson.

Roulstone, S., Glogowska, M., Enderby, P. and Peters, T.J., 1999, Issues to consider in the evaluation of speech and language therapy for pre-school children. *Childcare, Health and Development* ***2*****5**, 141-155

Rutter, M. and Pickles, A., 1990, Improving the quality of psychiatric data: Classification, cause and course. In D. Magnusson and L.R. Bergman (Eds), *Data quality in longitudinal research,* pp.32-47. Cambridge: Cambridge University Press.

Saxton, M., 2005, Recasts in a new light: Insights for practice from typical language studies. *Child Language Teaching and Therapy* **21**, 23-38.

Wechsler, D., 1992, *Wechsler Pre-school and Primary Scale of Intelligence-Revised - 3rd UK edition*. London: Harcourt Assessment.

Weismer, S. and Evans, J.L., 2002, The role of processing limitations in the early identification of specific language impairment. *Topics in Language Disorders* **22**, 15-29.

World Health Organisation, 1992, *The ICD-10 Classification for Mental and Behavioural Disorders: Diagnostic Criteria for Research*. Geneva, Switzerland: WHO.

Acknowledgements

We would like to thank Dawn Smith, Head of Speech and Language Therapy Services at Lambeth PCT; Jane Stokes, Co-ordinator of the Speech and Language Therapy Services - Community Team at Lambeth PCT, for her encouragement and continued support throughout the project; the parents/carers and children of Lambeth who agreed to take part in the study; the Speech and Language Therapists in Lambeth PCT, for their flexibility and help in carrying out the assessments for the study; Lambeth PCT, for part-funding the original MSc project.

Appendix 1: Parental questionnaire

Lambeth Speech and Language Therapy Service- Children and Young People
Parent/Carer Questionnaire
Please fill in this questionnaire to give your views of your child's skills.

Please read the statements below and circle a number 1 to 3 (where 1 = not true and 3 is certainly true) that you feel best describes your child.			
Is restless, overactive, cannot sit still for long	1	2	3
Gets upset when he/she has to share	1	2	3
Often has temper tantrums	1	2	3
Prefers to play alone	1	2	3
Constantly fidgety or squirming	1	2	3
Finds it difficult to get on with other children	1	2	3
Is easily distracted, concentration wanders	1	2	3
Doesn't finish things he/she has started	1	2	3
Can't seem to follow instructions at home	1	2	3
Can't tell you about things that have happened at Nursery	1	2	3
Isn't able to answer your questions	1	2	3
Doesn't do what you ask	1	2	3
Doesn't seem to know his/her colours and sizes	1	2	3

Is picked on by other children	1	2	3
Uses physical strength to get what he/she wants when playing with other children	1	2	3

Tell us about how your child's difficulties affect different areas of your child's life by answering the following questions. (Please circle a number between 1 to 4 for each question, where 1 = not at all and 4= very much).

How much do these difficulties interfere with your child's:

Home Life:

1	2	3	4

Friendships

1	2	3	4

Learning

1	2	3	4

How much do these difficulties distress your child?

1	2	3	4

How much do your child's difficulties impact on you or your family as a whole?

1	2	3	4

Is there anything else about your child that you think may be important? If so, feel free to comment below:

Name: _____ Date: _____

Relationship to child:_____

Thank you for taking the time to fill in this questionnaire.

Appendix 2: Therapy activities

Activity 1- “Hello/Welcome routine”. The children and SLT would sing a song, which included each child’s name. Each child would then have to wait for their turn to be welcomed into the group.

Activity 2- “Picture Description/Information Task”. This activity was carried out during story time. It was split into “listening” and “talking”:

Listening task:

- The SLT would tell a story using a book with the text reduced to an appropriate level for the group. Each utterance would then be repeated four times.
- The SLT would then retell the main components of the story using visual props for each picture. These might include the use of miniature dolls and objects or laminated pictures from the story which the SLT referred to. Each utterance would be repeated four times.

Talking task:

- Children would take turns in retelling the “story” using the visual props or the book. The SLT would provide the correct model as and when the child produced an incorrect target.

Activity 3 - “Vocabulary Task”. For the Intensive group, this involved a range of activities using both phonological and semantic approaches. The phonological approach used puppets in “did I say it right games”. The semantic approach was used to teach new words through categorising and describing items according to similarities and differences in function/physical description. The Nursery-based group received only the semantic techniques.

Activity 4 - “Grammar Task”, Intensive group only. This task involved the use of puppets and

miniature dolls and objects depending on the target of therapy. The puppet would provide the correct model and the child would then be asked what the puppet had said. At the end of the repetition task, the puppet produced grammatical errors as well as correct models related to the focus of the therapy, and the child was asked to identify when it was correct and repeat it.

Activity 5 – "Expressive information". Expressive information was targeted through a range of " make and do" activities, again divided into listening and talking tasks. These activities were based around the group topic, e.g. if the topic was food, then these activities might be making sandwiches, making "fruit smoothies".

Listening Task:

- The SLT would explain the items needed for the make and do task as well as the sequence of the tasks using Makaton symbols and short target utterances which were repeated twice.

Talking Task:

- The child would have to request items required for the activity and explain the sequence using the previously modelled utterances.
- The child would be given an immediate behavioural reward each time he/she successfully requested the necessary items and described the sequence of the activity.

Activity 6 - "Free play", Intensive group only. The children played with a range of toys based on the topic of the group. In this less structured session, the SLT modeled language to support sharing and negotiating amongst the group, and provided recasting when appropriate. The children receiving the nursery-based therapy had play opportunities outside of the group, as part of the normal nursery routine.

Activity 7 – "Linguistic concepts". This used multi-sensory, experiential approaches to learning. Tasks were organised along a continuum of difficulty from active experiential learning

opportunities to understanding concepts as picture representations. For example, in learning about prepositional concepts such as ‘in’, ‘on’ and ‘under’, first the children would have the opportunity to experience going on and under various pieces of furniture while the SLT modeled the utterance for the concept. Then the therapist used miniature objects and a box providing further modeling opportunities. Games might include “hide and seek” of toys with the SLT modeling the concept. Finally, games would involve the use of pictures representing the concepts.
Activity 8 – “Closing activity”. The children and the SLT would sing a song, which included each child’s name. The children would wait for their turn to sing goodbye to the group.

Appendix 3: Speech and Language Therapist questionnaire

Questionnaire for Speech and Language Therapists.

As part of my research, I am comparing the effectiveness of different interventions offered to a group of SLI children over an 8-month period in Lambeth. Please describe the SLT intervention _____ received from the service between September 04 and April 05. Please skip to the section relevant to you: Section A = SLTs in Nursery, Section B= SLTs in Clinic and Section C: SLTs delivering the MSC Language Groups.

Section A *= SLTs in Nursery only*

1. Over the 8-month period, how many group therapy sessions did _____receive? Please specify how many sessions in total, how long these sessions lasted and how frequently they were delivered.

2. Please describe the format of the sessions below:

Activity 1:_____

Activity 2:_____

Activity 3: _____

Activity 4:_____

Activity 5:_____

Activity 6:____ _____

3. Please specify the techniques used for the following aims:

a) Understanding of Grammar:

b) Expressive Language (info):

c) Expressive Language (grammar):

d) Vocabulary:

4. Did staff help run the therapy groups with you? If yes, please describe how tasks were allocated.

4a. There is a certain amount of carryover assumed to be taking place in your service i.e. that staff carry out therapy tasks when they are not receiving direct input from you. Please tick the box that you feel sums up this level of carryover for each task from discussion with staff:

Understanding of Grammar:

□ None at all □ A little (1x week) □ A lot (2x3 times per week) □ Optimal amount (carried over into everyday activities)

Expressive Language (info):

□ None at all □ A little (1x week) □ A lot (2x3 times per week) □ Optimal amount (carried over into everyday activities)

Expressive Language (grammar):

□ None at all □ A little (1x week) □ A lot (2x3 times per week) □ Optimal amount (carried over into everyday activities)

Vocabulary:

□ None at all □ A little (1x week) □ A lot (2x3 times per week) □ Optimal amount (carried over into everyday activities)

Please comment:

5. Are there any other factors which you feel may have influenced the child's Speech and Language development during this period?

Section B:

1. Did you provide advice and a programme for this child? If yes, please describe:

2. Are there any other factors which you feel may have influenced the child's Speech and Language development during this period?

Section C:

1. Did any of your sessions deviate from the planned schedule and number of hours of therapy prescribed? If so please specify:

2. Are there any other factors which you feel may have influenced the child's Speech and Language development during this period?

Thank you for your time.

What is already known on this subject:
There is considerable evidence that speech and language therapy interventions are effective in the areas of expressive language and vocabulary. However, there is a gap in evidence for the effectiveness of intervention for children with comprehension difficulties.

What this study adds:
A group of pre-school children with SLI made significant improvements following direct intensive group therapy intervention on both comprehension and expressive language compared with carefully matched groups who received a more consultative nursery-based model of intervention or no intervention.

Figures 1a-e: Comparison of group performance post intervention

Figure 1a: Comprehension of Grammar

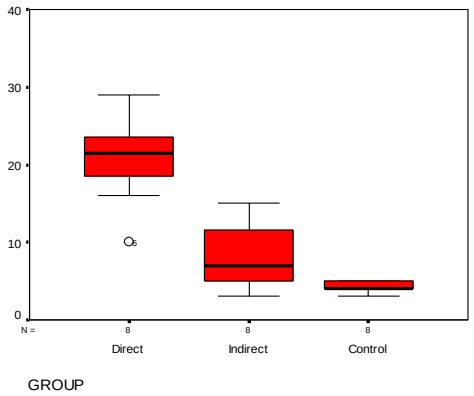
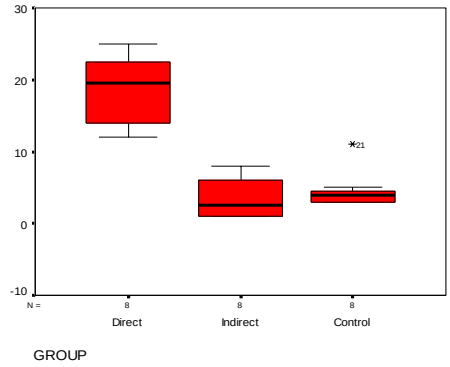


Figure 1b: Comprehension of Vocabulary



1c: Expressive Vocabulary

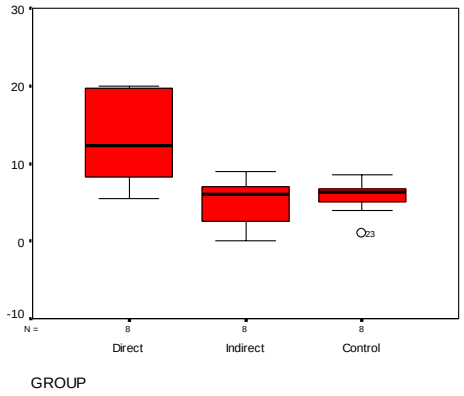


Figure 1d: Expressive Information

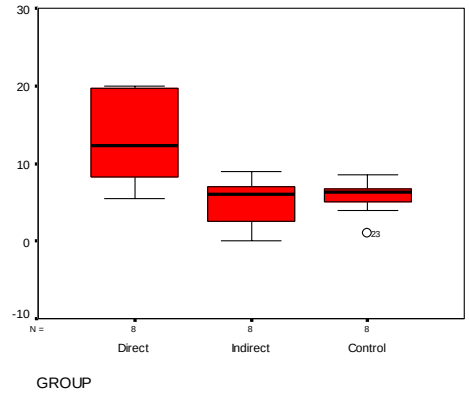


Figure 1e: Expressive Grammar

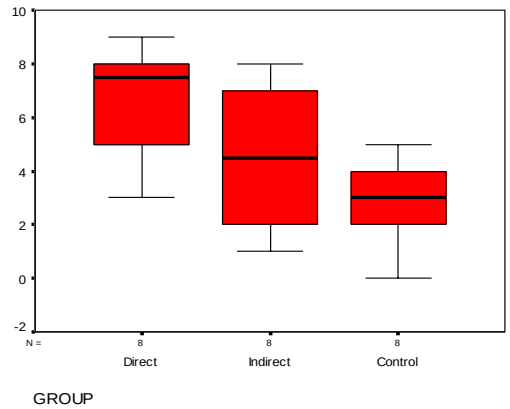


Table 1: Background information on participants

Position in Family		Family History of Speech and Language Difficulties		Ethnicity		Language Status		Housing
Youngest	45.8%	Yes	54.2%	Afro-C	37.5%	Bilingual*	33.3%	Council 87.5%
Eldest	39%	No	41.6%	British	29.2%	Monolingual	66.7%	Private 12.5%
Middle	4.1%	Not Sure	4.2%	African	29.2%			
Only	4.2%			European	4.2%			

*Exposed to both English and another language since birth.

Table 2: Means, standard deviations and ranges for Intensive, Nursery-based, and No Intervention groups at baseline

	Intensive Mean (SD) [Range]	Nursery-based Mean (SD) [Range]	No intervention Mean (SD) [Range]
Performance IQ	89.5 (5.97) [85-102]	89.87 (4.49) [85-99]	89.75 (6.25) [85-103]
Comp of Grammar	17.25 (3.77) [10-22]	18.4 (7.54) [8-28]	20.38 (6.67) [8-28]
Attention Task 1	8.1 (.99) [7-10]	8.25 (1.03) [7-10]	8 (1.3) [6-10]
Attention Task 2	5.12 (1.64) [3-8]	5.37 (1.4) [4-8]	5.13 (1.6) [3-8]
Expressive Language	7.88(3.13) [4-13]	8.57 (2.28) [6-11]	8.06 (2.11) [4-11]
Expressive Grammar	4.75 (2.25) [2-8]	4.42 (1.92) [2-7]	4.75 (2.25) [2-8]
Expressive Vocabulary	5.37 (2.56) [3-9]	6.71 (1.33) [5-9]	5.75 (2.54) [3-9]
Comp of Vocabulary	12.5 (3.74) [8-18]	16.9 (3.39) [11-18]	12.5 (3.74) [8-18]
Parent Language Scores	7.37 (2.5) [4-10]	9.43 (3.1) [5-15]	8 (2.73) [4-13]
Parent Attention Scores	8.5 (1.6) [7-11]	9.57 (2.5) [6-13]	7.5 (2.45 [5-12]
Parent Behaviour Scores	6.75 (1.59) [3-8]	6.71 (2.81) [2-11]	6.37 (1.3) [5-8]
Parent Play Scores	3.62 (1.85) [2-7]	4 (1.41) [2-6]	3 (1.07) [2-5]
Parent Impact Scores	9.88 (2.86) [7-16]	11.7 (3.35) [7-16]	10.5 (3.74) [7-18]

Table 3: Means, standard deviations and ranges for Intensive, Nursery-based and No Intervention groups post-intervention

	Intensive Group Mean (SD) [Range]	Nursery-based Group Mean (SD) [Range]	No Intervention group Mean (SD) [Range]
Comprehension of Grammar*	36.75 (7.79) [26-46]	26.62 (6.47) [15-34]	23.38 (7.75) [12-32]
Comprehension of Vocabulary*	21.00 (5.61) [12-29]	13.50 (4.41) [5.5-18]	17.25 (4.62) [11-24]
Expressive Language	11.37 (3.33) [7-16]	9.12 (2.23) [6-12]	13.75 (3.70) [5-16.5]
Expressive Grammar*	13.75 (2.31) [10-17]	9.62 (2.77) [6-14]	7.62 (2.56) [4-11]
Expressive Vocabulary*	31.75 (5.8) [22-39]	24.13 (3.48) [19-29]	8.88 (2.03) [6-11]
Parent Language Scores*	4.5 (1.07) [3-6]	5.5 (2.98) [2-11]	7.13 (1.36) [5-9]
Parent Attention Scores*	4.88 (1.64) [3-8]	7.75 (1.99)]5-11]	6.5 (7.71) [4-12]
Parent Behaviour Scores	4.75 (1.38) [3-7]	5.13 (2.54) [2-9]	5.38 (2.67) [1-5]
Parent Play Scores	1.87 (1.46) [1-5]	3 (2.27) [0-6]	3 (1.41) [1-5]
Parent Impact Scores*	5.25 (1.67) [3-8]	9.88 (2.64) [7-14]	10.5 (3.74) [7-18]

*Significant at the 0.01 level

Erratum

In the article, there are some inconsistencies in Table 3 and Figure 1.

The first five rows of Table 3 should be replaced with the following:

Table 3: Means, standard deviations and ranges for Intensive, Nursery-based and No Intervention groups post-intervention

	Intensive Group, Mean (SD) [Range]	Nursery-based Group, Mean (SD) [Range]	No Intervention group, Mean (SD) [Range]
Comprehension of Grammar*	36.75 (7.79) [26-46]	26.62 (6.47) [15-34]	23.38 (7.75) [12-32]
Comprehension of Vocabulary*	31.75 (5.8) [22-39]	24.13 (3.48) [19-29]	17.25 (4.62) [11-24]
Expressive Information	21.00 (5.61) [12-29]	13.50 (4.41) [5.5-18]	13.75 (3.70) [5-16.5]
Expressive Grammar*	11.37 (3.33) [7-16]	9.12 (2.23) [6-12]	7.62 (2.56) [4-11]
Expressive Vocabulary*	13.75 (2.31) [10-17]	9.62 (2.77) [6-14]	8.88 (2.03) [6-11]

*Significant at the 0.01 level

Graph (c) in Figure 1 should be replaced with the graph below:

(c)