PRESCHOOL LANGUAGE INTERVENTION

Can Oral Language Skills be trained at Pre-school Age?
An Evaluation of a Nursery Language Intervention

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Abstract

Background: This study aimed to identify nursery aged children with poor oral language skills and provide them with language training prior to school entry. **Methods**: A randomised controlled trial was carried out in 13 UK nursery schools. In each nursery, eight children (N = 104, mean age = 3;6) with the poorest performance on standardised language measures were randomly allocated to either an intervention group or a waiting control group. The intervention group received a 15-week oral language programme in addition to their standard nursery curriculum. The programme was delivered by trained teaching assistants and aimed to foster three key areas: vocabulary knowledge, narrative and listening skills. **Results:** Initial results revealed significant differences between the intervention and control group on measures of taught vocabulary. No group differences were found on any standardised language measures.. **Conclusions:** The study shows that a short intervention for small groups of preschool children can be effective but generalisation to non-taught areas of language is poor. The findings have implications for the practice of supporting nursery children's language development within a preschool setting.

Keywords: preschool, nursery, language, intervention, RCT

Oral language abilities encompass a variety of linguistic processes needed for communication (Cooper, Roth, Speece & Schatschneider, 2002). The NICHD Early Child Care Research Network (2005) indicates that oral language comprises vocabulary and semantic knowledge, narrative discourse, grammatical skills, and listening comprehension. Together, these oral language skills not only influence the development of literacy and educational attainment (e.g., Catts, Fey, Tomblin, & Zhang, 2002; Nathan, Stackhouse, Goulandris, & Snowling, 2004; Snowling, Bishop, & Stothard, 2000), but also aspects of behaviour and psycho-social well-being (e.g. Clegg, Hollis, Mawhood, & Rutter, 2004).

The "simple view" of reading (Gough & Tunmer, 1986) postulates that reading for meaning depends upon two components: decoding and language comprehension. Early oral language ability is associated with variations in the development of both decoding and comprehension skills. Phonological awareness is the language skill most critical skill for learning to read (decode) and is one of the most robust predictors of variations in reading accuracy (decoding ability) (Melby-Lervag et al., 2102 for a review). However, there is evidence that broader oral language skills, especially vocabulary knowledge, underpin the development of phonological awareness (e.g., Burgess & Lonigan, 1998; Carroll, Snowling, Hulme, & Stevenson, 2003; NICHD, 2005). Oral language therefore indirectly affects the development of reading accuracy through its influence on phonological awareness. Longitudinal studies have shown that early oral language skills uniquely predict phonological awareness from kindergarten through to grade 2 (Cooper et al., 2002) and that pre-school children's oral language abilities influence later phonological awareness development (Storch & Whitehurst, 2002).

The direct effect of oral language on reading comprehension is more widely recognised. Reading comprehension depends upon the ability to understand spoken language; therefore, children with weak oral language skills are at risk of reading comprehension difficulties (Hulme & Snowling, 2012). Further, children who do not develop proficient oral language skills tend to have persistent and pervasive difficulties, especially if they fail to receive additional support for their language weaknesses (Haynes & Naidoo, 1991; Law, Boyle, Harris, Harkness, & Nye, 2000). Together these findings imply that the early identification of young children at risk of reading difficulties due to oral language weaknesses and provision of appropriate intervention is of the utmost importance.

The evidence for the efficacy of interventions that promote *oral language* abilities in the early years for those *at risk* of later difficulties is small, with the majority of research on pre-school intervention focusing on improving children's phonological awareness and other 'code-related' skills such as letter-sound knowledge (e.g. Bernhardt & Major, 2005; Gillon, 2005; Hindson et al., 2005;

Justice, McGinty, Piasta, Fan, & Kaderavek, 2010). Bowyer-Crane et al., (2008) evaluated a 20-week oral language intervention fostering speaking and listening skills for children during the first two school years (UK Reception and Year 1). Although the intervention had positive effects on vocabulary and grammar in comparison with a programme fostering reading and phonological skills, its impact on early literacy was difficult to ascertain because the study did not include an untreated control group. There was also limited generalization to standardized language measures. Nonetheless, building on these positive findings for oral language, Fricke, Bowyer-Crane, Haley, Hulme and Snowling, (2013) designed a 30-week programme primarily aimed at improving vocabulary, grammar and narrative skills but with some code-related work in the latter stages. The first 10 weeks of the programme were delivered in small groups of 2-4 children in preschool settings (nursery classes in the UK). This was followed directly by 20 weeks of daily intervention (alternating between small group and individual) in the Reception class. During the last 10 weeks of the programme, additional work on letter sound knowledge and phoneme awareness was included to bolster the phonics instruction the children were receiving in the mainstream classroom.

The findings of a randomized trial evaluating the oral language programme of Fricke et al., (2013) were positive. Not only did the programme improve oral language and narrative skills but there was generalization to standardized tests and non-taught vocabulary. At the end of the intervention, there were improvements in phoneme awareness and letter knowledge (but not word reading skills). An important further finding was that gains in reading comprehension six months after the intervention were fully mediated by gains in oral language. However, given the design of the trial, it was not possible to ascertain whether the better outcomes over those of Bowyer-Crane et al. (2008) were due to the longer duration of the programme (30 vs 20 weeks) or earlier start to its delivery in preschool. Thus, the main aim of the present study was to evaluate a version of the programme for delivery in nursery classes and to evaluate gains at the end of the preschool. The 'Nursery Language 4 Reading Programme' was designed as a 15-week programme to be delivered by trained assistants for the preschool settings. Building on the fact that children have increased benefits from longer, more intensive intervention (e.g. Pollard-Durodola et al., 2011), the programme duration and intensity was increased in comparison to the preschool portion of the Fricke et al. study (*op cit*) on which it was based and was delivered through a full school term. Children in the current study were recruited from several nurseries and were allocated to either the intervention or control group within each setting. The overarching aim of the trial was to evaluate the effectiveness of an oral language programme when implemented by trained Teaching Assistants in preschool settings.

Method

Trained teaching assistants (TAs) delivered a language intervention to small groups of children three times a week for 20-minute sessions in the children's nurseries. The performance of children who received the intervention for 15 weeks (intervention group) was compared to that of children who did not receive any treatment (waiting control group). Ethical approval was granted by the Research Ethics committee, Department of Psychology, University of York; informed parental consent was obtained for all children. The trial was conducted within schools and hence was not registered. Details of participant recruitment, allocation and flow through the study are summarised in the CONSORT diagram (Figure 1).

Participants

Participating children were identified from 13 nurseries in York, England in December 2010. Ten children per school were selected based on their comparatively poor performance on two standardised language tests (Clinical Evaluation of Language Fundamentals Preschool 2 ^{UK}; Expressive Vocabulary & Sentence Structure; Semel, Wiig, & Secord, 2006). Exclusions were children who spoke English as an additional language or had any special educational need other than language. One child, who was originally selected to take part was later excluded due to the severity of her speech and language difficulties. After parental consent was obtained from eight children in each nursery (N = 104, mean age 3;6), they were randomly allocated to either the oral language intervention or the waiting control group. The intervention group took part in the current programme, while the waiting control group received no treatment. The waiting control children were offered intervention according to need after school entry.

Attrition rates were low but differed between groups; one child was lost in the oral language group compared to four children in the waiting control group.

--figure 1----

Procedure

Children were assessed at t1 (pre-test) and the end of the intervention t2 (post-test). Testing was carried out by two masters' students from the University of York, Psychology Department with assistance from trained undergraduate students. All testers were blind to group membership, with the exception of the lead researcher who conducted the random assignment into groups. Following

randomisation, the lead researcher did not access the group membership file for the remainder of the project, and therefore had little recollection of which child belonged in which group.

Assessment Battery

Oral language (t1,t2)

Grammar Comprehension. The Clinical Evaluation of Language Fundamentals-Preschool 2 ^{UK} (CELF-Preschool 2^{UK}; Wiig, Secord, & Semel, 2006) sentence structure subtest measured reception of grammar. During this task children point to pictures, out of four possible choices, that represented spoken sentences.

Expressive vocabulary. The CELF-Preschool 2^{UK} (Wiig et, 2006) expressive vocabulary subtest measured referential naming skills. Children either named objects in pictures or described what was happening in the picture.

Expressive Language. The Action Picture Test (APT 4th ed; Renfrew, 2003) was used to evaluate the informational content and grammatical usage in children's spoken language. The assessor showed the child 10 small coloured picture cards and asked what was happening in the picture. The child's response was transcribed online in addition to being voice recorded.

Listening Comprehension. This task was adapted from the York Assessment of Reading Comprehension (YARC; Snowling et al., 2009). Children listened to two passages through headphones. After each passage, they answered eight literal and inferential questions about the passages.

Code-related skills

Letter-sound knowledge. The YARC Core Letter Knowledge subtest (Snowling et al., 2009) comprises 11 single letters and six digraphs. Children were shown each letter and were asked to produce the sound.

Alliteration matching. This test, adapted from Carroll and Snowling (2004), assesses phoneme (onset) awareness. Children were presented with a target word depicted pictorially and asked to identify which picture word (out of two possibilities) started with the same sound. There were two practice items and 10 test items. The test was discontinued after four consecutive errors.

Early word reading. The YARC Early Word Reading subtest (Snowling et al., 2009) requires children to read 30 high frequency words. Testing stopped after five consecutive errors

Taught vocabulary knowledge

Naming. This test was created to assess children's knowledge of the vocabulary words that were directly taught in the Nursery intervention programme. Children were shown a picture and asked to name the object or describe what was happening. All 45 taught words were included as test items, and there was no discontinuation rule.

Definitions. Of the 45 taught vocabulary words in the programme, a random sample of 12 taught words were selected and children were asked to give a verbal description of each. A set of scoring guidelines (4-points per item) was designed taking account of pre-school children's level of ability.

General cognitive ability

Block Design. This subtest from the Wechsler Preschool and Primary Scale of Intelligence- Third Edition (WPPSI-III ^{UK}; Wechsler, D., 2003) was used to assess non-verbal IQ. Testing discontinued after three consecutive scores of zero (reliability.75-.85).

"The Nursery Language4Reading (L4R) programme"

The Nursery L4R intervention is a 15 week programme designed for pre-school children. The intervention children took part in three 20-minute group sessions per week for the duration of 15 weeks (i.e., 45 intervention sessions). Every session was written prescriptively, followed the same general guidelines and included the following components: introduction, listening game, vocabulary, narrative, and plenary (see Table 1 for details).

----Table 1----

The programme content was based on work by (Fricke et al., 2013) with reference to the UK Early Years Foundation Stage (as current in 2010-11). The sessions were designed to be multi-sensory and children were encouraged to take an active role. The method of multi-contextual vocabulary instruction was based on the work of Beck and colleagues (e.g., Beck, McKeown & Kucan, 2002). Not only were participants taught new vocabulary, but they also took part in a variety of listening games and narrative activities that were designed to improve their knowledge of story structure, grammar and speaking skills. See Appendix B for a session delivery overview and list of taught vocabulary words.

The programme was delivered by a teaching assistant (TA) selected by each nursery school. To ensure treatment fidelity and provide appropriate support, the TAs delivering the programme were trained by the research team and received a detailed intervention manual. They also received on-going support through frequent tutorials at the University of York and one on-site tutorial. Here

they were observed by the lead researcher while delivering an intervention session and provided with immediate feedback and advice as well as a written report detailing strengths and areas for improvement. The observation and feedback helped the TAs to gain confidence in their successful delivery of the programme and assured the research team that the programme was being delivered as expected.

Results

The 15-week intervention took place three times per week and thus consisted of 45 sessions of which the TAs delivered on average ?????? (Range ?????-?????). The number of sessions attended by each child varied from ??????? to ????? (*M*=????).

Table 2 shows the pre- and post- intervention data for the language and literacy measures for the intervention and waiting control groups. There were floor effects for early word reading at t1 and t2. Cell sizes varied from 46 to 52 owing to variations in both pupil attendance and cooperation.

-----Table 2-----

Data were analysed using analyses of covariance (ANCOVA) controlling for differences in gender, age and baseline performance on each task in turn (the autoregressor). To verify that the assumption of homogeneity of regression slopes was met, an interaction term between the "group" and the "autoregressor" was used in a regression analyses as an independent variable along with the autoregressor and group. The interaction term was not significant for any measure, therefore it was dropped from the subsequent analyses.

----Figure 2 ----

Figure 2 shows the ?differences in? adjusted marginal means (t2 performances controlling for covariates) in raw scores between the two groups together with effect sizes above the error bars (Cohen's *d*). A positive difference represents more progress in the intervention than in the waiting control group. Error bars represent 95% confidence intervals (CIs) which do not cross the x-axis if the groups' progress differ significantly. Thus, the CIs in the figure illustrate that the intervention group shows advantages over the waiting control group only on the bespoke intervention vocabulary naming and definitions measures. The analyses confirmed significant group differences on the bespoke measures, intervention vocabulary naming $F(1,92) = 59.24$, $p = .000$ and definitions $F(1,90) = 10.78$, $p = .001$ and not on any of the other measures. Although the listening comprehension error

bar appears close to the zero threshold, the differences between groups on this task is not statistically significant $F(1,84) = 2.89$, $p = .093$.

In addition to statistical significance testing, effect sizes should be used to supplement the interpretation of results as they determine the relative magnitude of change. Cohen's d is the most common effect size used to assess the outcome of intervention programmes (Dunst, Hamby, & Trivette, 2004); there were moderate - large effect sizes on the significant bespoke measures, 1.04 and .66 respectively. All other effect sizes were small with the exception of listening comprehension which had a moderate effect size of .46. Though there was not a significant effect of intervention on listening comprehension skills, there was a meaningful effect which suggests that an increased number of participants and power may yield significant differences between groups on this measure.

Discussion

We conducted a randomized controlled trial to evaluate the efficacy of a 15-week group interventions programme for children with weak oral language skills in preschool. The intervention group benefited significantly for being taught new vocabulary knowledge but there were no other significant differences between the language outcomes for the intervention and control groups. In particular, there was no transfer of new vocabulary knowledge to standardised tests of vocabulary (see Elleman, Lindo, Morphy, & Compton, 2009) or to 'code-related' skills. Thus, despite the promise of a structured multisensory programme for fostering oral language and reading readiness skills, the current findings are disappointing but not uncommon.

Although not directly comparable in terms of duration, the content of the programme was similar to the first 10 weeks of that of Fricke et al. (2013) also delivered in nursery classes. Scrutiny of group differences at the end of this nursery phase in that data set suggests that likewise, there were no significant differences on any measure though it will be recalled that the intervention children outperformed the control children on a wide array of language measures at the end of the 30-week intervention programme. A cautious conclusion therefore is that a nursery programme of this type may provide a good foundation for later language and literacy but gains in oral language proficiency are unlikely if it is delivered alone and not built upon after school entry. Indeed, the differential gains in listening comprehension were of moderate effect size, suggesting that had the programme been longer in duration, the intervention children may have shown greater improvement in this vital skill area.

A further plausible explanation for the pattern of null results is that pre-school children who participate in short-term oral language interventions have yet to develop the cognitive resources necessary to achieve meaningful gains on standardised measures of language.

Feedback sought from the TAs who delivered the programme indicated that the training and experience of delivery helped their personal and professional development. Anecdotally they felt that children had enjoyed the sessions and they benefited on a number of fronts. As far as can be ascertained from the records available as well as observation sessions programme implementation was competent and fidelity was high. The findings add to a body of evidence indicating that intervention programmes can be successfully delivered by trained teaching assistants (e.g., Savage, Careless, & Erten, 2009). Future research and evaluation should perhaps aim to include broader measures of school readiness than the language measures which are the focus here.

A limitation of the current study was that socio-economic status data were not collected. Although the National Early Literacy Panel's (2008) report suggests that targeted oral language intervention can be equally effective for typically developing children as for those who are at risk of later literacy difficulties, Ruston and Schwanenflugel (2010) reported the contrary: children entering their programme with lower vocabulary skills (½ SD below the mean) actually benefitted more from the intervention than those who had average vocabulary skills. Given the present findings, questions remain concerning the optimal structure and duration of an oral language intervention for pre-school aged children. Several null results from short-term intervention studies have emerged, and providing children with longer and more intensive intervention has been suggested as a means to increase programme benefits. Though a more rigorous programme is ideal, there are many practical issues surrounding programme implementation: children only attend nursery part-time, and attendance is often sporadic as it is not mandatory. Perhaps future research should aim to increase oral language skills by implementing a year-round curriculum that actively supports oral language development by creating a consistent language-rich environment (see Wilcox et al., 2011).

Conclusions

The present findings show that a structured oral language intervention programme including vocabulary instruction can benefit pre-school children on measures of taught vocabulary but generalization to broader language tasks is poor. Thus there is no 'quick fix' to bring children's oral language skills to the optimum level for entry into formal schooling. Future research should be directed toward understanding how best to bring about change in oral language by focusing not only upon specifically targeted programmes but also the language environment of preschool settings.

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Table 1

Nursery L4R: session content overview

Activity	Purpose	Timing
Introduction	Settle children into session, revise the days of the week and highlight the listening rules	2 minutes
Listening Game	Improve listening skills through multiple interactive games and encourage active listening	3 minutes
Vocabulary	Introduce and consolidate new vocabulary in a multi-contextual manner	6 minutes
Narrative	Improve expressive language and storytelling skills such as sequencing and knowledge of story elements	6 minutes
Plenary	Revise overall session to foster sequencing skills, reinforce taught vocabulary and award best listener	3 minutes

Table 2

Pre and post-test raw score means, standard deviations (SD) and t-tests showing group equivalence at baseline

Measure		Intervention Group		Waiting Control Group		Baseline Group Differences
		Pre	Post	Pre	Post	
	Reliabilities	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
CELF Expressive Vocab	.76-.85	12.23 (5.75)	17.67 (6.29)	11.80 (5.99)	18.00 (7.21)	t(101)=.369, p=.713
CELF Sentence Structure	.78-.80	9.06 (4.29)	13.08 (4.08)	8.78 (3.96)	12.85 (3.58)	t(101)=.336, p=.738
APT Information		20.29 (5.97)	25.91 (6.25)	20.66 (6.97)	25.28 (5.69)	t(101)=-.288, p=.774
APT Grammar		14.50 (5.69)	18.38 (5.82)	13.71 (6.31)	17.40 (5.38)	t(101)=.671, p=.504
YARC Letter-Sound Knowledge	.95	1.42 (1.76)	3.42 (3.30)	1.25 (1.75)	3.09 (3.24)	t(100)=1.01, p=.316
Alliteration Matching		4.15 (2.53)	5.13 (6.29)	4.14 (2.09)	4.78 (2.36)	t(95)=.006, p=.995
YARC Listening Comprehension		2.87 (2.28)	4.98 (3.08)	3.19 (2.46)	4.20 (3.05)	t(92)=-.652, p=.516
Intervention Vocab Naming (bespoke)		17.44 (5.75)	26.35 (5.27)	18.42 (6.31)	21.06 (5.16)	t(100)=-.819, p=.415
Intervention Vocab Definitions (bespoke)		4.93 (4.38)	8.48 (5.44)	5.41 (4.49)	6.05 (4.84)	t(98)=-.534, p=.595

Note: Maximum raw scores for the measures were as follows—CELF Expressive Vocab: 40; CELF Sentence Structure: 22; APT Information: 40; APT Grammar: 37; YARC Letter-Sound Knowledge: 17; Alliteration Matching: 10; YARC Listening Comprehension: 16; Intervention Vocab Naming (bespoke): 45; Intervention Vocab Definitions (bespoke): 48

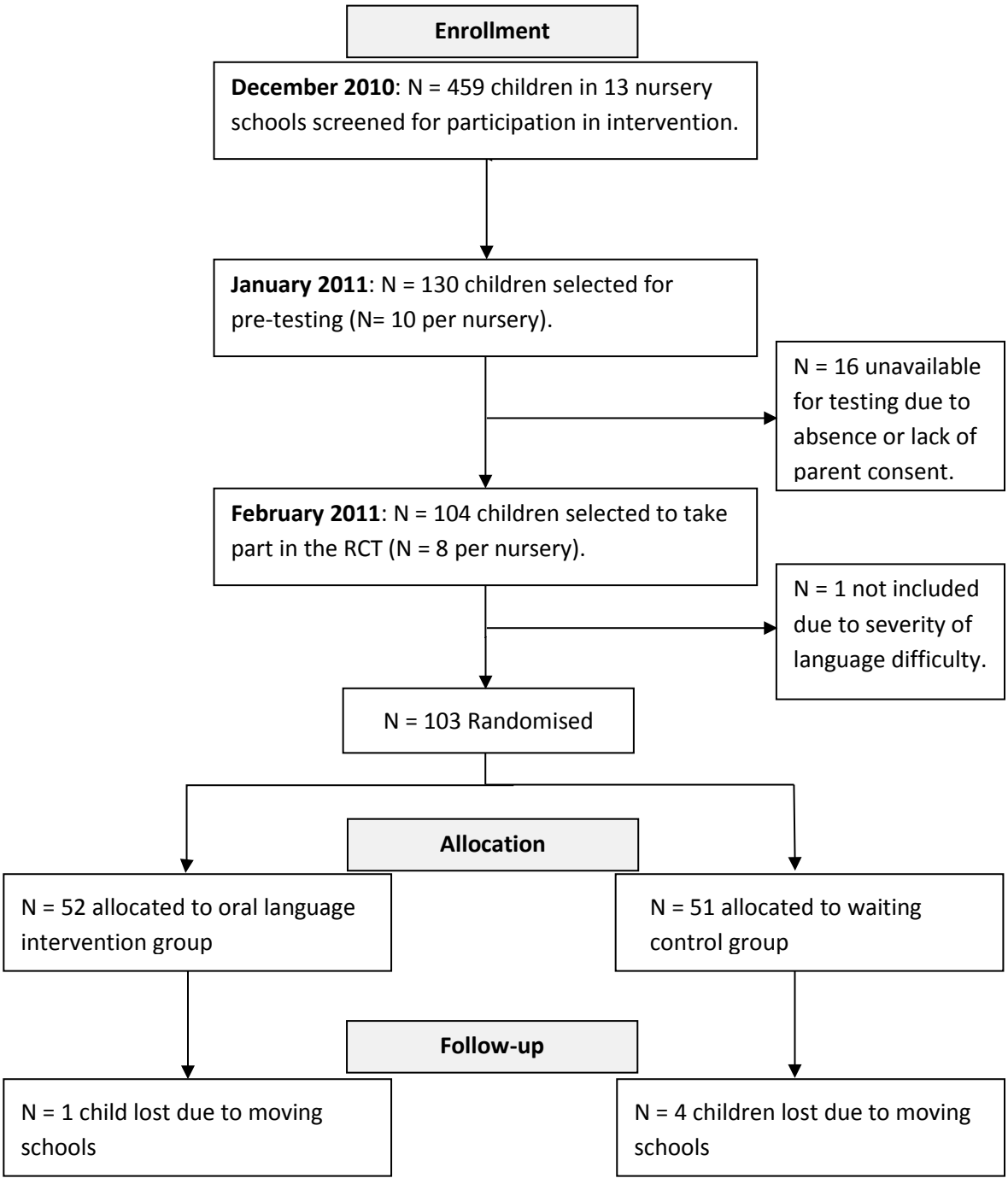

Figure 1. CONSORT flowchart detailing the selection, allocation and attrition of participants

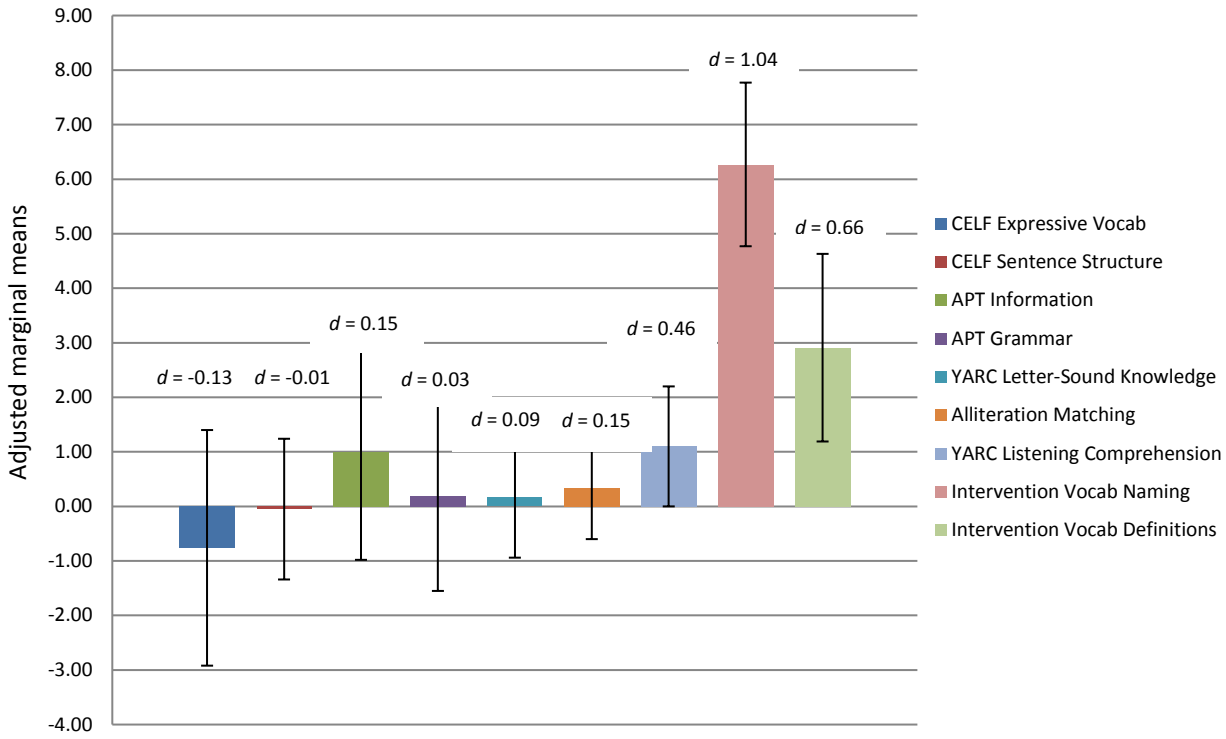

Figure 2. Differences between intervention and waiting control groups (Adjusted marginal means with 95% confidence intervals and effect sizes above error bars)

Appendix B

Week	MONDAY	TUES	WEDNESDAY	THUR	FRIDAY
1	**Session 1:** Introduction & Child + Adult		**Session 2:** Child + Adult		**Session 3:** Parents + Grandparents
2	**Session 4:** Parents + Grandparents		**Session 5** Teacher + Neighbours		**Session 6:** Teacher + Neighbours
3	**Session 7:** Hug + Laugh		**Session 8:** Hug + Laugh		**Session 9:** Read + Work
4	**Session 10:** Read + Work		**Session 11:** Same + Different		**Session 12:** Same + Different
5	**Session 13:** He + She		**Session 14:** He + She		**Session 15:** Consolidation
6	**Session 16:** Bedroom + Wardrobe		**Session 17:** Bedroom + Wardrobe		**Session 18:** Kitchen + Fridge
7	**Session 19:** Kitchen + Fridge		**Session 20:** Bathroom + Shower		**Session 21:** Bathroom + Shower
8	**Session 22:** Cook + Smell		**Session 23:** Cook + Smell		**Session 24:** Open + Close
9	**Session 25:** Open + Close		**Session 26:** Tidy + Messy		**Session 27:** Tidy + Messy
10	**Session 28:** Inside + Outside		**Session 29:** Inside + Outside		**Session 30:** Consolidation
11	**Session 31:** Park + Play		**Session 32:** Park + Play		**Session 33:** Swing + Slide
12	**Session 34:** Swing + Slide		**Session 35:** Puddle + Jump		**Session 36:** Puddle + Jump
13	**Session 37:** Hide + Count		**Session 38:** Hide + Count		**Session 39:** Hot + Cold
14	**Session 40:** Hot + Cold		**Session 41:** Over + Under		**Session 42:** Over + Under
15	**Session 43:** In front + Behind		**Session 44:** In front + Behind		**Session 45:** Consolidation and celebration