Oral Language Skills Intervention in Pre-school – A Cautionary Tale.

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Abstract

Background: While practitioners are increasingly asked to be mindful of the evidence-base of intervention programmes, evidence from rigorous trials for the effectiveness of interventions that promote oral language abilities in the early years is sparse.

Aims: This study evaluates the effectiveness of a language intervention programme for children identified as having poor oral language skills in preschool classes.

Methods & Procedures: A randomised controlled trial was carried out in 13 UK nursery schools. In each nursery, eight children (N = 104, mean age = 3 years 11 months) with the poorest performance on standardised language measures were selected to take part. All but one child was randomly allocated to either an intervention (N = 52) or a waiting control group (N = 51). 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 vocabulary knowledge, narrative and listening skills.

Outcomes & 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 measure; however there were gains of moderate effect size in listening comprehension.

Conclusions & Implications: The study suggests that an intervention, of moderate duration and intensity, for small groups of preschool children successfully builds vocabulary knowledge, but does not generalize to non-taught areas of language. The findings strike a note of caution about implementing language interventions of moderate duration in preschool settings. The findings also highlight the importance of including a control group in intervention studies.

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What this paper adds?

What is already known on this subject?

Oral language and communication skills are critical foundations for learning to read and children's readiness to learn in general. Over the last few years our understanding of how to support children with language difficulties has grown but the evidence-base for intervention approaches that promote oral language abilities in the early years remains limited. Although earlier studies suggest positive effects of oral language intervention in Reception and beyond, results for targeted support exclusively in preschool is less clear.

What this study adds?

This study shows that a structured oral language intervention programme can benefit preschool children on measures of taught vocabulary but generalization to broader language tasks is limited. These findings are important for future research on language intervention programmes and show that there is unlikely to be any early 'quick fixes' for children's oral language difficulties.

Oral language abilities encompass a variety of processes needed for communication (Cooper, Roth, Speece & Schatschneider, 2002) and at school, language is the medium of instruction. It follows that competent language skills are required to access the school curriculum and consistent with this, language skills predict academic attainments (e.g., Nathan, Stackhouse, Goulandris, & Snowling, 2004; Snowling, Bishop, & Stothard, 2000) and more specifically, variations in word-level decoding and reading comprehension skills (Catts, Fey, Tomblin, & Zhang, 2002; Hulme et al., 2015); they also influence aspects of behaviour and well-being (e.g., Clegg, Hollis, Mawhood, & Rutter, 2005). Together these findings imply that the early identification of children at risk of language learning difficulties and the provision of appropriate intervention is of the utmost importance (e.g., Law, Boyle, Harris, Harkness, & Nye, 2000).

Evidence for the efficacy of interventions that promote oral language abilities in the early years is sparse, with the majority of research on preschool intervention focusing on

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improving children's phonological awareness and other reading-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 the efficacy of 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, there was limited generalization to standardised language measures. However, building on these positive findings, Fricke, Bowyer-Crane, Haley, Hulme and Snowling (2013) designed an oral language programme that started earlier in preschool and extended through the first two terms of formal schooling. The programme primarily aimed to improve vocabulary, grammar, narrative and active listening skills. For the first 10 weeks of the programme, small groups of 2-4 children received the intervention three times a week in a preschool setting (nursery classes in the UK). Directly following this they received 20 weeks of daily intervention in the Reception class (alternating between small group and individual teaching). 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 class.

Fricke et al. (2013) showed that children receiving the 30-week intervention, beginning in preschool and extending into Reception, made greater gains in oral language and narrative skills than a waiting control group who received 'business as usual'. Moreover, there was generalization to both untaught vocabulary and standardised tests of language. At the end of the intervention, there were improvements in phoneme awareness and letter knowledge (but not in word reading skills). Importantly, the intervention group showed significant gains in reading comprehension six months after the intervention had finished, and these gains were fully mediated by gains in oral language measured at the end of the

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intervention. While these findings were positive, given the design of the trial, it was not possible to assess 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 its earlier start in preschool.

Notably, when Fricke et al. (2013) evaluated the first 10 weeks of the language programme conducted in preschool in isolation; there was no evidence of effectiveness at that time. These results could be attributed to the duration and intensity of the preschool portion of the intervention or the age at which it was given.

The present study aimed to evaluate an extended version of the preschool portion of the programme developed by Fricke et al. (2013). The '*Nursery Language4Reading (L4R) Programme*' was designed to be delivered by trained teaching assistants in preschool settings before entry into school. Given that children show increased benefits from longer, more intensive intervention (e.g., Pollard-Durodola et al., 2011), the programme duration was increased to 15 weeks in comparison to the 10 week preschool intervention given in the Fricke et al. study (2013). The preschool intervention sessions took place three times a week in both the Fricke et al. and the current programme; however, in the current programme the sessions were lengthened from 15 to 20 minutes each. In sum, these modifications resulted in participants receiving twice the amount of language intervention as those in the preschool portion of the Fricke et al. (2013) study (15 vs. 7.5 hours total).

A secondary aim of the current study was to investigate whether improvements in oral language skills would have indirect effects on untaught early reading-related skills such as letter knowledge, phonological awareness and word reading. We hypothesized that children who took part in the nursery intervention would perform better than the control

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group on measures of language (both taught and standardised) immediately after the intervention programme.

Method

Participants

Ethical approval was granted by the Research Ethics committee, Department of Psychology, University of York. Head teacher consent was given for the intervention to be delivered in schools and informed parental consent was given for each child who participated in the study.

Based on a sample size calculation, the aim was to recruit at least 100 participants (50 intervention; 50 control) for the current study to ensure adequate power. To achieve this, participating children were identified from 13 nurseries in the North of England in December 2010. Children entering Reception in the upcoming school year were screened with the exception of children who spoke English as an additional language and those who had been identified by schools as having special educational needs other than language difficulties. Children were selected based on comparatively poor performance on two standardised language tests (Clinical Evaluation of Language Fundamentals Preschool 2 ^{UK} (CELF); Expressive Vocabulary & Sentence Structure; Wiig, Secord, & Semel, 2006). Ten children with the lowest composite CELF scaled scores within each preschool were initially selected; however informed parental consent was obtained from only eight children per preschool (N = 104, mean age 3;11). The participating children's composite CELF scaled scores differed between schools ranging from 5 to 9 with an overall average of 7, one standard deviation below the mean. Before randomization, one of the children originally selected was excluded due to the severity of her expressive speech and language difficulties

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(CELF Expressive Vocabulary scaled score of zero). This decision was made in consultation with the child's parent who contacted the first author with concerns that the programme may not be the right fit for her child. The remaining children (N=103 mean age 3;11) were then randomly allocated to either the oral language intervention or the waiting control group. The randomization was conducted using an algorithm in Excel created by one of the contributing authors, ensuring that the first author was initially blind to group membership. The waiting control group was offered intervention according to need after school entry; however, this was not monitored by the research team and was implemented at the discretion of each participating school based on their interpretation of their children's post-test performance and the overall programme effectiveness.

Details of participant recruitment, allocation and flow through the study are summarised in the CONSORT diagram in Figure 1 (Moher, Schulz, & Altman, 2001).

----Figure 1----

Procedure

Children were assessed at *t1* (pre-test) and the end of the intervention *t2* (post-test). The pre-test took place just prior to the 15-week intervention and the post-test was conducted as soon as possible upon completion (within a three week time period). Testing was carried out by the first author and another Psychology graduate student from the University of York, Psychology Department with assistance from trained Psychology undergraduate students. All testers were blind to group membership with the exception of

the first author who conducted on-site tutorials where she observed an intervention session taking place, thereby gaining awareness of group membership before post-testing occurred.

Assessment Battery

The selected measures align with the oral language skills directly targeted by the intervention (vocabulary knowledge, listening comprehension, narrative, grammar and speaking skills). The supplementary reading related measures were included to assess if there were any indirect benefits of the intervention for these skills. This study was based on the work of Fricke et al. (2013); therefore the same measures were used to allow direct comparisons between the two studies. The format of the taught vocabulary test were the same as Fricke et al. (2013); though the words taught and tested differed.

Oral language (t1, t2)

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

Expressive Vocabulary. The CELF-Preschool 2^{UK} (Wiig et al., 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) assessed 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 each picture. The child's response was transcribed online and digitally recorded.

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

Reading-related skills (t1, t2)

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. To assess phoneme (onset) awareness, children were presented with a target word depicted pictorially and asked to identify which picture (out of two possibilities) started with the same sound (after Carroll & Snowling, 2004). There were two practice items and 10 test items.

Early Word Reading. The YARC Early Word Reading subtest (Snowling et al., 2009) requires children to read 30 high frequency words.

Taught vocabulary knowledge (t1, t2)

Naming. This test was created to assess children's knowledge of the words 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.

Definitions. Of the 45 taught vocabulary words in the programme, a random sample of 12 taught words was 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 preschool children's level of ability.

General Cognitive Ability (t2)

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Block Design. This subtest from the Wechsler Preschool and Primary Scale of Intelligence-Third Edition (WPPSI-III ^{UK}; Wechsler, 2003) was used to assess non-verbal IQ. This measure was included at *t2* for the purpose of characterizing the sample though it was not an outcome measure (there is no reason to believe that scores on this test would be affected by a language intervention).

Description of "The Nursery Language4Reading (L4R) Programme"

The Nursery L4R intervention is a 15 week programme designed for preschool children. The programme consists of three 20-minute group sessions per week over 15 weeks (i.e., 45 intervention sessions, total 15 hours). The intervention was manualised. Every session 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, McKeown and Kucan (2013). Children also took part in listening games and narrative activities designed to improve their knowledge of story structure, grammar and speaking skills.

The programme was delivered by a teaching assistant (TA) selected by each nursery school. TAs delivering the programme were trained by the research team and received a

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detailed intervention manual. Each TA attended an initial training day in which they received an introduction to the structure of language, its importance to children's school experience, and how it can be supported, followed by specific guidance on the programme, the manual and what was required of them. To help ensure treatment fidelity and provide appropriate support, they also received on-going support through monthly tutorials held at the University of York. One on-site tutorial was also conducted where each TA was observed by the first author 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 increased the research team's confidence that the programme was being delivered as expected.

The performance of children who were randomly allocated to receive the 15-week intervention (intervention group) was compared with that of children who did not receive any treatment (waiting control group).

Results

The 15-week intervention took place three times per week and thus consisted of 45 sessions. On average, the TAs delivered 42 sessions (range 34 – 45). The number of sessions attended by each child varied from 29 to 45 (*M* = 39 sessions). At baseline, participating children (N=103) were, on average, 3 years 11 months old and 53% were males. Participant's mean non-verbal IQ was average with a scaled score of 10. The breakdown of participant characteristic by group can be found in Table 2.

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

Table 3 shows the pre- and post- intervention raw scores 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. 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.

-----Table 3-----

Data were analysed using analyses of covariance (ANCOVA) controlling for differences in gender, age and baseline performance on each task (the autoregressor). To verify that the assumption of homogeneity of regression slopes was met, an interaction term between group and baseline measure was assessed. Since the interaction term was not significant for any measure, it was dropped from the models.

----Figure 2 ----

Figure 2 shows adjusted marginal mean differences between groups (t2 performance controlling for covariates) in raw scores, 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). Where these do not cross the *x*-axis the progress of the two groups is statistically significantly different.

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Thus, the CIs in the figure illustrate that the intervention group perform significantly better than the waiting control group only on the taught vocabulary measures. The analyses confirmed significant group differences in naming of the intervention vocabulary ($F(1,92) = 59.24$, $p<.001$) and for definitions ($F(1,90) = 10.78$, $p< .001$) but not for any of the other measures. Differences in listening comprehension were not statistically significant $F(1,84) = 2.89$, $p= .093$ (but see below).

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 (Cohen, 1997) is the most common effect size used to assess the outcome of intervention programmes (Dunst, Hamby, & Trivette, 2004); there were moderate to large effect sizes on the measures of intervention vocabulary (1.04 and .66 for naming and definitions respectively). All other effect sizes were small with the exception of listening comprehension which had a moderate effect size of .46 (95% CI -0.15 – 1.95). Though there was not a significant effect of intervention on listening comprehension skills, this effect size suggests that a larger sample size with greater power may yield significant differences between groups on this measure.

Discussion

We conducted a randomized controlled trial (RCT) to evaluate the efficacy of a 15-week language intervention programme for children with weak oral language skills in preschool, delivered in three 20-minute sessions per week. We predicted that children who took part in the preschool intervention would perform significantly better than the control group on both taught and standardised measures of language.

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The intervention group showed significant improvements on measures of directly taught vocabulary but there was no generalization to standardised language measures. The moderate effect size for improvements in listening comprehension (d=.46) is certainly encouraging and requires further study with a larger sample to confirm whether this is a reliable finding. The intervention did not produce statistically significant improvements in children's early reading related skills.

These findings indicate that directly delivered intervention of medium duration and intensity can improve targeted vocabulary knowledge: a result consistent with previous findings (for review see Marulis & Neuman, 2010; Parsons, Law & Gascoigne, 2005). However, the failure to find generalisation to standardised measures of language highlights the difficulties associated with improving broader oral language skills through early preschool intervention.

The lack of generalizability is in line with Wake et al.'s (2015) recent preschool RCT that provided 18 hours of one-on-one intervention to 4 year old children with language difficulties. At immediate post-test there was no evidence of children in the intervention group outperforming the control group on standardised tests of language. In fact, follow-up testing one year later revealed that both groups progressed equally in expressive and receptive language and their difficulties resolved by 2/3 and 1 SD score, respectively.

Our findings together with those of Wake et al. (2015) speak to the importance of designing intervention research with a control group: the lack of difference between the intervention and control groups on the standardised tests was due to equal progress being seen in both groups. This is particularly important to highlight for practitioners who may not include a control group and thus interpret positive outcomes as being due to the intervention rather than other possible factors.

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The content of the programme was similar to the preschool portion of the Fricke et al. (2013); however the duration and intensity was increased. The current study was successful in cultivating taught vocabulary in a preschool setting; a positive finding that was not apparent in the preschool portion of the Fricke et al. (2013) intervention. Nevertheless, the Fricke et al. (2013) programme in its entirety (10 weeks nursery + 20 weeks Reception) provides robust evidence for improvements in taught and standardised language measures as well as early reading related skills. It seems the efficacy of that programme may have been attributable to the fact that the preschool sessions provided a foundation on which to build the later oral language work or, alternatively, that the additional 20-week component delivered in primary school was the critical factor.

Reflecting on current findings, the children in this study received 15 hours of extra language input; arguably, this is a remarkably small amount of attention to be given to these children's needs considering the enduring impact of poor language on educational attainment. However, a further issue is that good practice for delivering interventions includes reinforcing what is taught in the wider setting context (e.g., Beck McKeown & Kucan, 2013). Given the constraints of a randomized trial, we specifically discouraged this here, but it may be especially important during the early years when, arguably, spoken language should be the priority of all those concerned with children's education.

Feedback sought from the TAs who delivered the programme was wholly positive. 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 TAs (e.g., Savage, Careless, & Erten, 2009). However, questions remain concerning the optimal structure and duration of an oral language intervention for preschool aged

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children and these findings strike a note of caution regarding the impact of language interventions of short or medium duration (see also Dockrell, Stuart, & King, 2010). An alternative is 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 preschool 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

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Table 2

Summary of participant characteristics at baseline

	Intervention Group	Waiting Control Group
	Mean (SD)	Mean (SD)
Age (Months)	47.12 (3.52)	47.53 (3.92)
Non-verbal Ability (scaled score)	10.22 (3.18)	9.66 (3.14)
Gender (% Male)	52%	55%

Note. Non-verbal ability was collected at *t2* as a descriptive measure.

Table 3

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[a]	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[a]	9.06 (4.29)	13.08 (4.08)	8.78 (3.96)	12.85 (3.58)	t(101)=.336, p=.738
APT Information	.98[b]	20.29 (5.97)	25.91 (6.25)	20.66 (6.97)	25.28 (5.69)	t(101)=-.288, p=.774
APT Grammar	.92[b]	14.50 (5.69)	18.38 (5.82)	13.71 (6.31)	17.40 (5.38)	t(101)=.671, p=.504
YARC Listening Comprehension	.77[a]	2.87 (2.28)	4.98 (3.08)	3.19 (2.46)	4.20 (3.05)	t(92)=-.652, p=.516
YARC Letter-Sound Knowledge	.95[a]	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 Early Word Reading	.97[a]	0.00 (0.00)	0.37 (1.23)	0.04 (0.20)	0.15 (0.47)	t(98)=-1.43, p=.156
Intervention Vocab Naming (taught)	--	17.44 (5.75)	26.35 (5.27)	18.42 (6.31)	21.06 (5.16)	t(100)=-.819, p=.415
Intervention Vocab Definitions (taught)	--	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 Early Word Reading: 30; YARC Listening Comprehension: 16; Intervention Vocab Naming (taught): 45; Intervention Vocab Definitions (taught): 48
Reliability: [a]Cronbach's alpha; [b]Interrater reliability; [c]Split-half reliability

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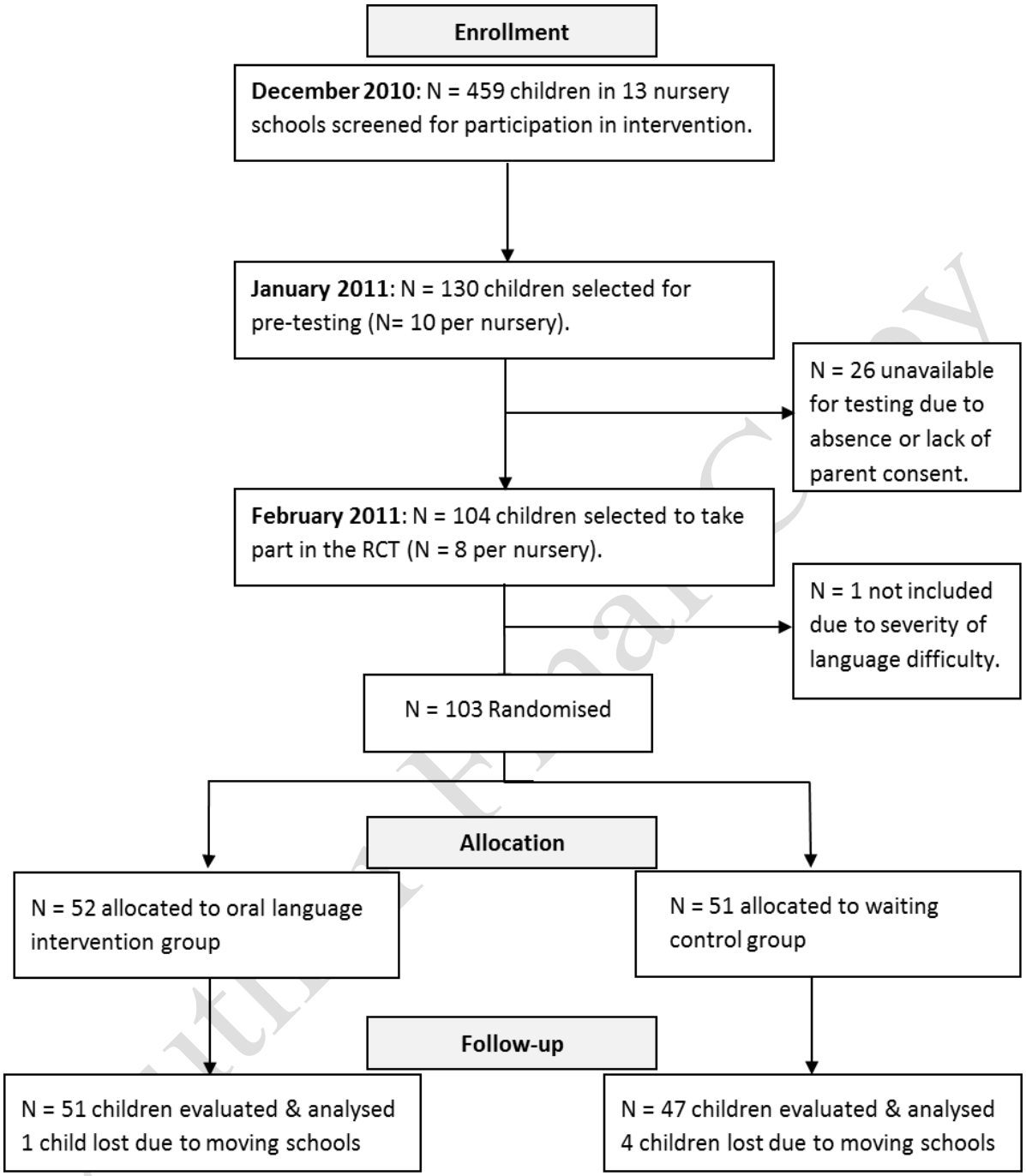

Figure 1. CONSORT flowchart detailing the selection, allocation and attrition of participants

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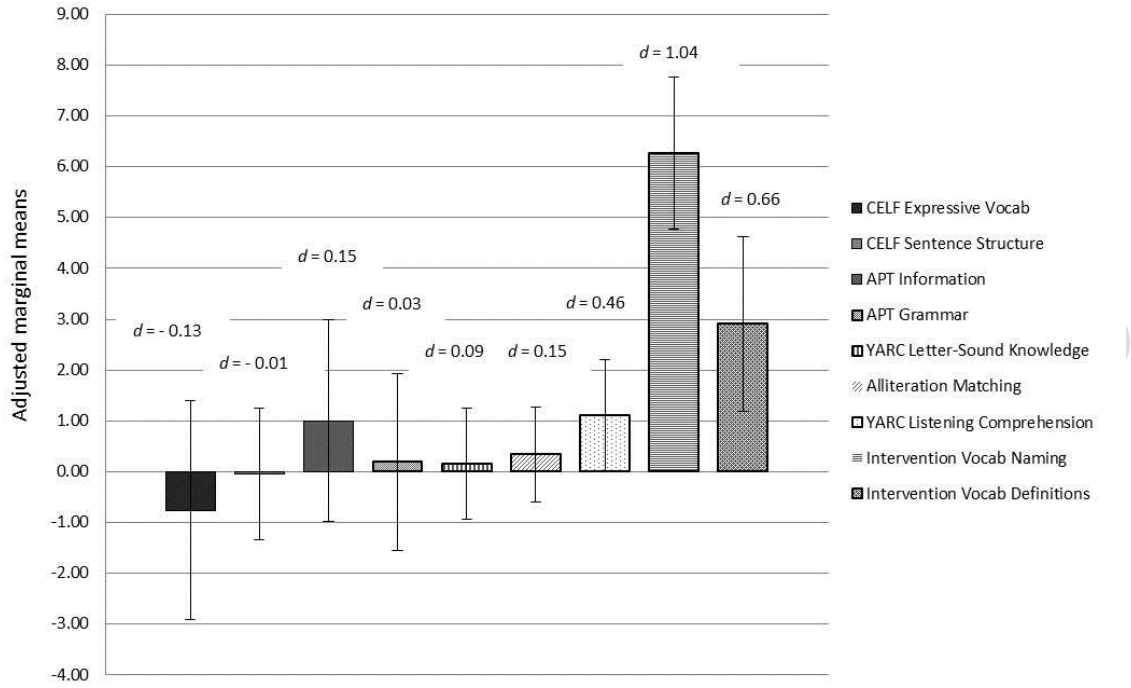

Figure 2. Differences between intervention and waiting control groups (Adjusted marginal means with 95% confidence intervals and effect sizes above error bars)