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Curriculum vocabulary learning intervention for children with emotional and behavioural difficulties (SEBD): findings from a case study series

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## Abstract

Although a considerable proportion of children with SEBD are reported to have impoverished or impaired language development (Clegg, Stackhouse, Finch et al., 2009; Cohen, Barwick, Horodezky et al., 1998), very little is known about how children with SEBD learn language, specifically the curriculum vocabulary that is essential to their engagement and learning in the classroom. The present study evaluates a combined phonological and semantic approach to new word learning that is reported to be effective for other populations of children with language impairment (Parsons, Law & Gascoigne 2005; Ellis Weismer & Hesketh 1998; Zens et al., 2002).

## Method

Five children with SEBD educated in a Primary Inclusion Centre (PIC) were recruited to the study. The children completed a series of language and literacy measures to determine their language and literacy profiles before participating in the curriculum vocabulary intervention. The intervention facilitated phonological awareness skills as a precursor to a second phase of intervention that combined phonological and semantic approaches to the learning of specific curriculum vocabulary. In total, four sessions of phonological awareness intervention and six sessions of curriculum vocabulary learning intervention were completed individually on the site of the PIC during the school day. Both phases of the intervention were evaluated using a repeated measure within subject design to determine the effectiveness of the intervention across the five participants.

## Results

Assessment identified lower than average language and literacy abilities although the profiles varied across the participants. The participants made significant progress in their phonological awareness skills and maintained this progress as a result of the first phase of the intervention. In phase 2, the participants learnt all the target curriculum vocabulary compared to none of the control words. This learning was maintained four weeks after the completion of the intervention.

#### Conclusions

Primary age school children with SEBD are able to engage in structured interventions to facilitate their curriculum vocabulary learning, and they benefit from the same phonological and semantic approaches to vocabulary learning as other children with language impairment do. Identifying the language abilities of children with SEBD may be productive in informing how best to facilitate their language learning to promote their optimal engagement and learning in the classroom. The challenges of engaging children with SEBD in structured interventions and the robust evaluation of this are discussed.

#### Key words

Vocabulary learning, children, emotional and behavioural difficulties, intervention, case study series

## Background

Studies confirm that a considerable proportion of school age children and adolescents with emotional and behavioural difficulties (SEBD) also have language impairments when measured on standardised assessments of language (Clegg, et al., 2009; Cohen, Davine, Horodezky et al., 1993; Cohen, Barwick, Horodezky et al., 1998; Clegg, Stackhouse, Finch et al., 2009; Giddan, Milling & Campbell 1996; Ripley & Yuill 2005; van Daal et al., 2007). The nature of these language impairments are unclear in terms of how much, if at all the language impairments contribute to the SEBD (Beitchman 1985; Rutter et al.; Law et al., submitted; Whitehouse et al., 2012). Nevertheless, these language impairments will potentially impact on engagement in learning, literacy development and educational attainment. There are very few studies that report on the effectiveness of language interventions for children with SEBD (Law, Plunkett & Stringer 2011; Law & Garrett 2004).

## Vocabulary Learning

The term language impairment (LI) is used to describe children who experience significant difficulties in their language and communication development. These may be children with delayed language development or children who have more pervasive learning disabilities involving language impairment, such as Autism Spectrum Disorders (ASD) and Down Syndrome. Children with LI usually have significant difficulties in learning new words compared to children with typical language development (Ellis Weismer & Hesketh 1998; Gray 2006; McGregor, Friedman, Reilly et al., 2002). New word learning is essential to overall language and communicative competence and subsequent literacy development and educational attainment.

Vocabulary learning is dependent on children acquiring the phonological and semantic knowledge of a new word (Ellis Weismer & Hesketh 1998; Gillon 2004; Gray 2005; Horohov & Oetting 2004; McGregor, Friedman, Reilly et al., 2002; Metsala 1999; Nash & Donaldson 2005; Zens, Gillon & Moran 2009). Phonological knowledge refers to learning in-depth phonetic and phonological information about a word. In comparison, semantic knowledge refers to understanding the meaning of the word, e.g., description, function and how the meaning of the word relates to other words and their meanings. Where this is achieved the child is then able to form a robust and accurate representation of the word in his vocabulary store or lexicon. When the learning of the phonological and semantic knowledge is not sufficient or accurate, an inadequate representation is learnt which results in an impoverished vocabulary or difficulties accessing and retrieving words in the lexicon quickly and accurately. Children with LI are reported to have specific difficulties extracting the phonological and semantic knowledge of new words which then impacts on their vocabulary acquisition (Ellis Weismer & Hesketh 1998; Gray 2006; McGregor, Friedman, Reilly et al., 2002).

Despite there being much knowledge about how children learn vocabulary, the evidence base for specific vocabulary intervention with school age children with LI is sparse (Cirrim and Gillam 2001; Steele & Mills 2011). This small evidence base indicates that school age children with LI do learn new words through direct intervention combining phonological and semantic approaches (Parsons, Law & Gascoigne 2005; Ellis Weismer & Hesketh 1998; Zens et al., 2009).

Case Studies as a Method to Evaluate Interventions

Evaluating speech, language and communication interventions essentially involves measuring change in these behaviours and demonstrating whether the identified changes are a result of the intervention and not other factors. For example, change can be a result of continuing development or maturation regardless of that skill being the focus of the intervention. Change can be due to experiences beyond the intervention or even practice on the measures that are used to evaluate the intervention. Measures that control for such factors have to be built into the design of an evaluation to show that any change identified can be attributed to the intervention.

Evaluating these interventions is therefore complex and there is much debate about the most robust methodologies to be used. Randomised Controlled Trials (RCTs) are usually cited as the most robust with case studies at a much lower level of the evidence base (Horner, Carr, Halle et al., 2005; Morgan & Morgan 2009; Pring 2005; Robey & Schultz 1998-). The major weakness of case study methodology is that they fail to be representative of the population of interest so testing an intervention with one case study or a series of case studies fails to examine the potential effects of the intervention across that population (Horner et al., 2005; Morgan & Morgan 2009). Despite this and other limitations, case studies enable an initial examination of the effects of an intervention, particularly where this is a new intervention or an established intervention implemented with a new population (Horner et al., 2005; Morgan & Morgan 2009). Case studies also offer a detailed examination of individual responses to the intervention, which is not always feasible in large cohort studies. The population of children with SEBD often find it very challenging to participate in assessments and interventions, which require lengthy concentration and compliance (Lane et al., 2001; Law & Sivyer 2005; Stringer 2006-).Case studies can accommodate this by tailoring the assessment

and intervention to the individual child and thus designing assessments and interventions that the child can fully participate in.

This study originated from collaboration between the department of Human Communication Sciences (HCS), University of Sheffield and the Local Education Authority, specifically the Primary Inclusion Service. The Primary Inclusion Service provides education for children with significant SEBD who have been permanently excluded from mainstream school or are at risk of permanent exclusion. One Primary Inclusion Centre (PIC) became the focus of the collaboration as the centre was particularly concerned about the language and communication skills of their pupils and were seeking support to improve these skills in the pupils accessing their centre. The impoverished vocabulary of the pupils in the PIC was identified by the staff as a significant area of concern, which was considered to impact significantly on the progress pupils were making in their educational attainment. Impoverished vocabulary was described as pupils not being able to learn the required curriculum vocabulary with subsequent implications for their progress through core curriculum topics and also their literacy development. A series of projects were completed to explore the speech, language and communication skills of the pupils along with some exploratory intervention studies focusing on vocabulary learning. Undergraduate speech and language therapy students in the department of HCS completed these projects as part of their undergraduate research dissertations (Foote 2009; Ford 2011; Keene 2009; Danvers 2010; Maleham 2011; Turnpenny 2010). The findings from these exploratory projects indicated that some pupils in the PIC had speech, language and communication difficulties when assessed on standardised measures and some of these pupils benefitted from vocabulary intervention that focused on facilitating phonological awareness skills and then learning both the semantic meaning of the



vocabulary along with the phonological structure of the vocabulary. The present study aimed to replicate these preliminary findings using a more robust study design at the level of a case study series.

The present study employed a case study series using a repeated measure within subject design to evaluate interventions targeting curriculum vocabulary learning in children with significant SEBD. The intervention consisted of two phases. Phase 1 targeted the phonological awareness skills of the pupils as a pre-requisite to phase 2, which focused on using a combination of semantic and phonological approaches to facilitate learning of curriculum vocabulary words. The study was designed and implemented in the context of the PIC and so, had to meet the demands of conducting and evaluating intervention in a challenging, real life context. Principally, this involved completing repeated assessments with pupils and ensuring fidelity in the intervention when engagement and compliance is a significant challenge for these pupils. To accommodate these challenges while maintaining the robustness of the research, the case study design incorporated 1) specific outcomes measures tailored to measure the intervention; 2) control outcome measures which were not expected to change as a result of the intervention and; 3) multiple baselines before and after the intervention to show consistency in the behaviours targeted.

#### Aims and Research Questions

The aim of the study was to conduct an exploratory evaluation of interventions targeted at facilitating curriculum vocabulary learning in primary school age children with significant SEBD. Five primary school aged children attending a Pupil Inclusion Centre (PIC) participated in two interventions. The first intervention targeted their phonological awareness

skills as a pre-cursor to the second intervention, which targeted their learning of curriculum vocabulary and combined phonological and semantic approaches to this vocabulary learning. A case study series involving a repeated measure within subjects design was used to evaluate the two interventions.

#### Research questions:

1. Do primary school age children with SEBD educated in a Primary Inclusion Centre (PIC) have varying profiles of language and literacy abilities according to standardised and criterion-referenced assessments?
2. Will primary school aged children with SEBD educated in a PIC be able to participate in interventions targeted at vocabulary learning?
3. Are interventions targeted at facilitating vocabulary learning in children with SEBD educated in a PIC effective when measured using case study methodology?

#### Method

##### Participants

Participants were five primary school aged children who attended a PIC in a large city in the North of England. The PIC provides placements for primary school age children who have reached School Action Plus of the Special Educational Needs Code of Practice for SEBD or have a statement of Special Educational Need for SEBD. These children are either permanently excluded from school or at significant risk of permanent exclusion. Children usually attend the PIC on a part time basis while still attending their previous educational provision. The overall aim of a placement at the PIC is either to facilitate the child returning

**Comment [JL1]:** Please put in a sentence describing what these mean for the international audience

to their previous educational provision full time or where this is not deemed appropriate, a transition to an alternative educational provision.

The five participants were all male and aged between six years and eight years and three months. The background to each participant is now described:

**Comment [JL2]:** We have lots of useful information here but do we have information about the child's SES? Maternal education etc.

#### Participant 1 (P1)

P1 was 7;02 years. He attended the PIC three days a week and his mainstream primary school two days a week. He had a history of violence both at home and school and it was reported that he had recently assaulted a member of school staff at the mainstream primary school he attended.

#### Participant 2 (P2)

P2 was 7;02 years. He attended the PIC for three days a week and his mainstream primary school for two days a week. He was reported to have diagnoses of Attention Deficit Hyperactivity Disorder (ADHD) and delayed motor development. At the time of the study, he was participating in an assessment led by the local Child and Adolescent Mental Health Services (CAMHS) to investigate if he met criteria for an Autism Spectrum Disorder (ASD) with associated learning difficulties.

#### Participant 3 (P3)

P3 was 6;01 years. He attended the PIC for two days a week and his mainstream primary school for three days a week. He was also undergoing an assessment through the local CAMHS for a potential diagnosis of ASD.

#### Participant 4 (P4)

P3 was 6;0 years. He attended the PIC for three days a week and was receiving home education for the remaining two days. P3 had been permanently excluded from his previous mainstream provision due to his violent behaviour to staff and pupils.

#### Participant 5 (P5)

P5 was 8;03 years. He attended the PIC for two days a week and his mainstream primary school for three days a week. He had previously received Tier 4 support from the local CAMHS where he was diagnosed with ADHD.

Consent was gained from the participants' parents and/or carers for their participation in the study. The study received ethical approval from the Research Ethics Committee, Human Communication Sciences, University of Sheffield.

#### Design

A series of five case studies using a repeated measure within subject design was devised. For each case study, there were two parts. The first part was an assessment phase where a detailed assessment of each participant was completed and a profile of language and literacy

identified for each participant. The second part evaluated 1) the phonological awareness intervention and then 2) the curriculum vocabulary learning intervention.

## Measures

### Part 1: Profiling the language and literacy abilities of the participants

The five participants completed five standardized measures of receptive and expressive language as follows:

#### Receptive language

The Test for the Reception of Grammar – Version 2 (TROG – 2) (Bishop, 2003) measured receptive grammar at the sentence level. This is a widely used test which identifies difficulties in specific aspects of grammatical understanding such as function words, word order and inflections. Normative data is available from the TROG – 2 up to the age of 16 years and yields standard scores with a mean of 100.

The British Picture Vocabulary Scales- 2<sup>nd</sup> Edition –(BPVS II) (Dunn, Dunn, Whetton & Burley 1997) is an assessment of receptive vocabulary at the single word level for children aged three to 16 years. The BPVS II was used to gain a measure of receptive vocabulary. The target word is read aloud to the participant and the participant has to point to the correct picture of the word from a selection of four. Normative data is available from the BPVS II up to the age of 16 years and gives standard scores with a mean of 100.

The Listening to Paragraphs subtest from the Clinical Evaluation of Language Fundamentals – UK Fourth Edition (CELF-UK<sup>4</sup>) (Semel, Wiig & Secord 2006) was used to assess understanding at a paragraph level. In this subtest, short stories are read out to the participant

who then completes a series of questions pertaining to the factual and inferential information in the story. Normative data is available from the CELF-UK<sup>4</sup> up to the age of 16 years and yields standard scaled scores from 3 to 16 where 10 is the mean.

#### Expressive language

The Formulating Sentences subtest from the CELF-UK<sup>4</sup> assessed the ability to verbally formulate semantically and syntactically appropriate sentences. The ability to generate expressive language is crucial to engaging in learning through discussion and debate in the classroom. The participant is shown a picture and verbally presented with a stimulus word that is related to the picture. The participant is then required to make up a sentence that uses the stimulus word and is also related to the picture. The item is scored according to the syntactic complexity of the sentence and the semantic content.

The Recalling Sentences subtest also from the CELF-UK<sup>3</sup> is a measure of expressive language and sentence memory and is considered to be a sensitive measure of language impairment (Norbury et al., 2002). In this test, participants are required to repeat sentences of increasing length.

The TROG-2 provides standard scores with a mean of 100 and standard deviation (SD) of 15. CELF-UK<sup>4</sup> provides scaled scores for each subtest with a mean of 10 and SD of 3. Two thirds of children perform in the normal range; between 85 and 115 on the TROG-2 and between 7 and 13 on the CELF-UK<sup>4</sup> (Semel et al., 2006). A score that is one SD below the mean has been taken to be indicative of a significant difficulty or impairment (Bishop 2003), corresponding to a percentile of 16 or less, a CELF-UK<sup>4</sup> standard score below 7, or a TROG

-2 standard score below 85. A score greater than 2 SD below the mean corresponds to a severe level of impairment (Bishop 2003), represented by a percentile of 3 or less, a CELF-UK<sup>4</sup> standard score below 4, or a TROG-2 standard score below 70.

A measure of literacy was obtained by reporting each participant's reading age equivalent and the National Curriculum level for writing as measured by the PIC.

#### Part 2: Phonological Awareness Intervention

Two baselines (time 1 and time 2) were taken before the intervention to determine the consistency of the participants' phonological awareness prior to the intervention. These baselines were repeated twice after the intervention had finished, once immediately after the intervention finished (time 3) and the second four weeks later to determine if any improvements were maintained over time (time 4). The intervention period consisted of four sessions lasting between 20 and 30 minutes delivered twice a week over two weeks. The overall time period of the phonological awareness intervention study was nine weeks and was timed to ensure that weeks one to five took place in one school half term with the second post intervention measure (time 4) collected two weeks into the next half term. The one week half term holiday was therefore included in the maintenance period from week 5 to week 9. The structure of the intervention is shown in table 1.

Insert table 1 about here

Baseline Assessments

A standardised assessment of phonological processing called the Phonological Assessment Battery (PhAB) (Frederickson, Frith & Reason 1997) was initially chosen as the baseline measure. However, all five participants found the assessment too challenging and refused to complete it adequately in order for the standardised scores to be calculated. Therefore, a non-standardised assessment of phonological awareness skills was developed and adapted from Gillon (2004). This assessment measured phonological awareness at the levels of the phoneme, syllable and onset-rime. In the Phoneme Awareness Task, the child was asked to identify the first phoneme in a word where the words increased in structural complexity through the task. In the Syllable Awareness Task, the child was asked to clap to the number of syllables in the word where the words increased in complexity through the task. In the Rhyme Task, the child was asked to think of words that rhymed with the word presented. The complexity of the task increased by presenting words with fewer rhyming matches. Five words were used to assess each of the three levels giving a total of 15 words (see appendix 1). All three tasks were presented verbally with accompanying pictures to reduce the memory demands of the task. All five participants were able to comply with this simplified task of phonological awareness.

A measure of auditory memory was used as a control task. This was a number repetition task from the CELF-UK<sup>4</sup> where the participant was asked to repeat a string of digits forwards and backwards.

#### Phonological Awareness Intervention

The intervention adhered to the principles of phonological awareness intervention outlined in Schuele and Bondreau (2008). Words from a recent curriculum topic were used (All About



Me) as the participants were familiar with these words and phonological awareness skills are reported to be stronger for words that are already established in the child's lexicon (Metsala 1999). No vocabulary items from the baseline assessment were used during the phonological awareness intervention and the participants were not involved in any other activities involving phonological awareness during the time of the study. The intervention targeted each of the three phonological awareness levels assessed in the baseline assessments, namely phoneme identification, syllable awareness and onset-rime. Examples of intervention activities are given in appendix 2. The intervention consisted of a total of four individual sessions delivered over two weeks, each lasting between 20 to 30 minutes. The intervention sessions took place in a quiet room at the PIC during the school day.

#### Analysis

Descriptive comparisons of the baseline and post intervention measures were completed. Non-parametric statistical analysis of any changes between the first baseline assessment (time 1) and the second post-intervention assessment (time 4) was then conducted using the Sign Test to determine if any changes reached statistical significance.

**Comment [JL3]:** Would there be any chance of including as graph here to capture the results pictorially?

#### Part 2: Curriculum Vocabulary Intervention

The curriculum vocabulary intervention commenced six weeks after the end of the phonological awareness intervention. Again, a repeated measures within subject design was employed for each of the five participants. Two baselines (time 1 and time 2) were taken before the intervention to determine the consistency of the participants' vocabulary prior to the intervention. These baselines were repeated twice after the intervention had finished, once immediately after the intervention finished (time 3) and the second four weeks later to

determine if any improvements were maintained over time (time 4). The intervention period consisted of six sessions lasting between 20 and 30 minutes delivered twice a week over three weeks. The overall time period of the curriculum intervention study was ten weeks and was timed to ensure that weeks one to six took place in one school half term with the second baseline collected two weeks into the next half term. Again, a one week half term holiday was therefore included in the maintenance period from week six to week 10. The structure of the intervention is shown in table 2.

Insert table 2 about here

#### Baseline Assessments

The baseline assessment consisted of six curriculum words to be taught in the intervention and six curriculum words not taught in the intervention. These six words are referred to as the control words and the six words the focus of the intervention as the target words. At the time of the study, the main curriculum topic being taught was 'homes and buildings'. In collaboration with staff at the PIC, 12 words (all nouns) were selected from the total of 40 words usually taught in this topic. These 12 words were considered by the staff to be words that each of the participants was unfamiliar with and therefore the target and control words differed across the participants. For each participant, the 12 words were divided into 6 target words and 6 control words (see table 3). All the words were nouns and differed in length and complexity. Matching the target words to the control words for frequency, length and complexity was not feasible.

Insert table 3 about here

The participants were assessed on the target and control words at two baseline assessments prior to the intervention and two post-intervention assessments, one immediately after the intervention and the other at a follow up assessment four weeks later. Knowledge of a word was assessed by accurate knowledge of the word meaning (semantic knowledge) and accurate knowledge of the phonological structure of the word (phonological awareness). Semantic knowledge was assessed by the child giving an accurate verbal description of the word without the help of a picture or any other visual information. Phonological awareness was assessed by accurate initial phoneme identification and accurate syllable identification. Rhyme production was not included due to the difficulties the participants had shown with rhyme production in the phonological awareness intervention and also due to the difficulty of finding rhyming pairs for all the target and control words (see results section).

#### Curriculum Vocabulary Intervention

The intervention consisted of a total of six sessions of 20 to 30 minutes twice a week over three weeks. The intervention was delivered individually to each participant by the researcher in a quiet room at the PIC during the school day. One target word was taught in each intervention session. The intervention followed a similar format to the intervention designed by Parsons et al., (2005) and focused on the participant learning both semantic and phonological information about the word. The 'Ten steps to becoming a word wizard' procedure and the 'How do we learn new words' resource was used for each word in each session (see Parsons et al., 2005). The aim of the intervention was to facilitate the participant's semantic knowledge and phonological awareness of the word in order to promote effective new word learning.

## Analysis

Descriptive comparisons of the baseline and post intervention measures were completed.

## Results

### Part 1: Profiling the language and literacy abilities of the participants

Table 4 shows the standardised language scores and the literacy levels of the five participants.

### Language Profiles

Participant 1: Scores on the receptive language assessments were within the normal range with the standard score of 106 on the TROG-2 above the mean for his age group. His scores on the expressive language assessments were more variable with a scaled score of 7 on the CELF –FS subtest and 3 on the CELF-RS subtest. Participant 2: Scores across the receptive and expressive language measures were all below the mean with significant impairments (two standard deviations or more) indicated on the TROG-2, the CELF-FS subtest and the CELF-RS subtest. Participant 3: Scores across two receptive language measures (BPVS-II and TROG-2) were more than one standard deviation below the mean, yet he gained a scaled score of 9 on the CELF-LP subtest. On the expressive language measures, he achieved a scaled score of 8 on the CELF-FS subtest and yet a much lower scaled score of 4 on the CELF-RS subtest. Participant 4: Like Participant 3, his scores across the BPVS-II and the

TROG-2 were more than one standard deviation below the mean with a scaled score at the lower end of the normal range on the CELF-LP subtest. On the two expressive language measures, the CELF-FS subtest and CELF-RS subtest, he gained scaled scores of 5 and 4 respectively. Participant 5: Like Participant 1, his scores on the three receptive language assessments were all within the normal range, albeit at the lower end. With respect to expressive language, he gained a very low, scaled score of 3 on the CELF-FS subtest and a higher score of 7 on the CELF-RS subtest.

Insert table 4 about here

#### Literacy Profiles

The literacy abilities of participants 3 and 4 had not yet been assessed by the PIC, and there was no previous literacy data available due to the participants' refusal to be assessed when younger. Participants 1 and 2 were in Key Stage 1 and are expected to be reaching level 2. Participant 5 was in Key Stage 2 and is expected to be working above level 2. P-scales are used as assessment criteria for children with special educational Needs (SEN) who are working below level one of the National Curriculum, with eight levels ranging from P1 to P8 (Qualifications and Curriculum Developmental Agency 2011). All five participants were reported by the PIC to have significant literacy difficulties and this was confirmed by the data collected by the PIC and the non-compliance of participants 3 and 4 in any literacy assessment at any point in their school career to date.

In summary, the language profiles of the five participants were variable. Participants 1 and 5 showed relatively strong profiles of receptive language in comparison to their expressive

language. Participants 2, 3 and 4 had weaker profiles across both receptive and expressive language although Participant 3 had a particularly inconsistent profile with the highest score across all the participants on the CELF-LP subtest.

## Part 2: Phonological Awareness Intervention

Table 5 shows the scores of the five participants on the three phonological awareness tasks (Phoneme Awareness Task, Syllable Awareness Task and the Rhyme Task) and the auditory memory control task at the two baseline assessments (time 1 and time 2) and the two post-intervention assessments (time 3 and time 4). At the first and second baselines, none of the five participants gained the maximum score on the three phonological awareness tasks. Indeed, there was consistency in both the individual task scores and the total phonological awareness score across the first and second baselines. At the second baseline, Participant 1 gained the highest total score of 8/15 and participants 4 and 5 the lowest total score of 3/15. All five participants gained their highest score on the Phoneme Awareness Task and their lowest scores on The Syllable Awareness Task and the Rhyme Awareness Task with the latter task proving to be the most difficult. The scores on the Auditory Memory Task were consistent at both baselines for all five participants.

Descriptive analysis of the two post-intervention assessments identified increases across the three individual task scores and the total scores for all five participants. Participants 2 and 5 gained the maximum total score of 15/15 at both post-intervention assessments (time 3 and time 4). Participants 1, 3 and 4 gained total scores of 14/15, 14/15, and 13/15 respectively at time 3. At the second post-intervention assessment (time 4), Participants 1 and 3 achieved the maximum score of 15/15. None of the participants' scores decreased from the immediate

post-intervention assessment to the follow up assessment four weeks later. Only one participant (Participant 2) showed any change in the score on the Auditory Memory Task. This was at time 3 where the score increased from 5 to 6. Otherwise, the scores on this control task were consistent throughout the four time points for all five participants. The non-parametric statistical analysis confirmed that the difference between the total score at time 1 and time 4 reached statistical significance for all five participants.

Insert table 5 about here

#### Part 2: Curriculum Vocabulary Intervention

Table 6 shows the scores of the five participants on the target and control words at the two baseline assessments (time 1 and time 2) and at the two post-intervention assessments (time 3 and time 4). At time 1 and time 2, all five participants scored 0/6 on both the target words and the control words for semantic knowledge. In comparison, at time 3 and time 4 post intervention, all five participants scored 6/6 for the target words but not the control words. All five participants scored 0/6 for the control words at both the post intervention time points. At the end of the intervention and four weeks later, all five participants showed the correct semantic knowledge for the target words but not the control words.

Phonological awareness proved to be more varied than semantic knowledge at the two baseline assessments and two post intervention assessments. At time 3 (immediately post intervention), all five participants showed intact phonological awareness in both initial phoneme identification and syllable count of the target words but not the control words apart from Participant 2 who scored 5/6 on syllable count. At time 4, four weeks post the

intervention all five participants showed intact phonological awareness on the target words and not the control words. At the end of the intervention, and four weeks later, the five participants had the correct phonological awareness (in terms of initial phoneme identification and syllable count) of the target words but not the control words.

Insert table 6 about here

## Discussion

The present study conducted an evaluation of intervention targeted at facilitating curriculum vocabulary learning in five primary school age children with significant SEBD educated in a PIC. The intervention facilitated phonological awareness skills as a precursor to a second phase of intervention that combined phonological and semantic approaches to the learning of specific curriculum vocabulary. A case study series involving a repeated measures within subject design was used to evaluate the two interventions. Prior to the intervention, the five participants completed a series of standardised assessments to determine their profile of language and literacy functioning.

In line with previous studies investigating the language and literacy abilities of children with SEBD, the profiles across the five participants varied (Clegg et al., 2005; Heneker 2005; Ripley & Yuill 2005). Generally, all five participants showed lower than average language ability across some or all of the receptive and expressive language measures. None of the participants scored within the normal range for their chronological age across all the language measures. Inconsistencies in the individual profiles were identified which suggests that the



participants may not have performed to the best of their abilities during the assessment. All five participants showed very low literacy attainment for their chronological age where the three participants with the lowest language abilities (Participants 2, 3, and 4) had refused to comply with any literacy assessment to date.

All five participants were able to engage and participate in both intervention phases; phase 1 focusing on phonological awareness skills and phase 2, facilitating curriculum vocabulary learning by combining phonological and semantic approaches. Across both phases, the intervention consisted of ten individual sessions of approximately 20 to 30 minutes for each session. The sessions took place on the premises of the PIC during the school day. All five participants made gains in their phonological awareness skills and then their learning of targeted curriculum vocabulary.

A repeated measure within subject design was used to evaluate both phases 1 and 2 of the curriculum vocabulary learning intervention. In phase 1, all five participants showed consistency across the two baseline measures in their phonological awareness skills. Immediately after the four intervention sessions, the scores on the baseline measures increased significantly and this was maintained at the post intervention assessment four weeks later indicating that the participants were maintaining these skills. A test of auditory memory was included as a control measure and the participants' scores on this remained consistent throughout the baseline assessments and the post intervention assessments. In summary, the findings indicate that the four sessions of phonological awareness intervention was effective in facilitating the phonological awareness skills of the five participants.

In phase 2, all five participants showed consistency across the two baselines of their semantic knowledge of the six target and six control words. Immediately after the six sessions of intervention, all five participants showed correct semantic knowledge of the six target words compared to none of the control words. This was maintained at the second post intervention assessment four weeks later. Interestingly, the participants' phonological awareness of the six target and six control words was more variable. Prior to the intervention, all five participants showed some phonological awareness of the target and control words, particularly initial phoneme identification rather than syllable count. Performance at both baselines was consistent. Immediately after the six sessions of intervention, four of the five participants gained the maximum score in both phoneme identification and syllable count for the target words and not the control words. This was maintained at the post intervention assessment four weeks later. In summary, the findings indicate that six sessions of intervention using phonological and semantic approaches to teaching six curriculum vocabulary words is effective.

**Comment [JL4]:** Please report the sign statistic plus p value in the text while referring to the table.

The findings from the study show that children with SEBD benefit from the same phonological and semantic approaches to new word learning that children with language impairment are reported to (Parsons, Law & Gascoigne 2005; Ellis Weismer & Hesketh 1998; Zens et al., 2009). The phonological awareness difficulties of the participants was surprising as there is very little reported in the research literature about the prevalence or nature of such difficulties in the population of children with SEBD (Lane et al., 2001). Phonological awareness ability is considered to be a significant prerequisite skill for literacy development (Bryne 1998; Goswami & Bryant 1990) and so, may prove to be a productive area of research and focus of intervention in the future (Hinshaw 1992; Carroll, Maughan,

Goodman & Meltzer 2005; Maughan & Carroll 2006; Willcutt & Pennington 2000). The nature of the language and literacy difficulties in the five participants reported remains unclear. Their inconsistent language profiles in conjunction with significant periods of disengagement from education suggests that their language difficulties are more related to impoverished language learning opportunities rather than more specific or pervasive language impairments. Nevertheless, their performance on the language measures suggests significant receptive and expressive language difficulties for some of these participants. Language ability is crucial for engagement and learning in school and therefore there is an argument for screening the language abilities of children with [EBDSEBD](#) and focusing on facilitating language skills to enable more effective engagement and learning in the classroom. The study confirms that children with [EBDSEBD](#) can participate in more structured vocabulary learning interventions and these can be effective in enabling them to learn new curriculum vocabulary.

#### Methodological Limitations

There are several important methodological limitations that must be acknowledged when considering the findings of the study. Firstly, this is a very small scale study and as with all case studies, the findings cannot be generalised across the population of children with [EBDSEBD](#) (Horner et al., 2005; Morgan & Morgan 2009). Secondly, a standardised measure of phonological awareness is preferable to the phonological awareness assessment task that was devised for evaluating the phonological awareness intervention in the phase 1 intervention. The participants though were not able to complete the standardised measure (PhAB) initially proposed and so, a much shorter task was devised which they could complete but is not standardised. It is important though to note that the PhAB was too

challenging for the participants and yet, the other standardised language measures were not. Thus, highlighting the difficulties these participants experience with phonological awareness. In retrospect, selecting one relevant subtest from the PhAB may have been a more realistic option and would have provided a standardised measure of phonological awareness. Thirdly, the control words in phase 2 of the intervention were not matched to the target words in terms of length, syllable structure, number of morphemes or frequency. Matching on these components enables a more robust comparison of the complexity of the words being learnt (Parsons et al., 2005; Zens et al., 2009) and whether the intervention is effective independent of the complexity of the words targeted. A fourth limitation is the selection of the target and control words in the phase 2 intervention. Although the two baseline assessments showed that none of the participants had intact semantic knowledge of the target and control words, a more robust study would select the target and control words from a much larger corpus rather than relying on teacher report of the children's knowledge of the words chosen (Parsons et al., 2005; Nash & Snowling 2005; Zens et al., 2009). Increasing the number of baseline assessments in both phases 1 and 2 would enable the consistency of behaviours targeted to be further established. The language profiles of the participants were not homogenous and therefore it is not possible to establish how individual language profiles contributed to the overall effectiveness of the intervention. This is particularly relevant given that two participants were completing assessment for a possible diagnosis of ASD. Finally, a future study could compare whether a phonological or semantic approach or indeed a combined approach is the most effective.

Despite the limitations discussed above, the study did incorporate several crucial elements of robust evaluation methodology. These included the completion of two rather than one

baseline measure, immediate and maintenance post intervention assessments, the inclusion of control variables in both phases of the intervention and using outcome measures that were specific to the intervention rather than more generic standardised assessments. This is a significant achievement when considering the challenging nature of this population where engagement and compliance are significant issues (Lane et al., 2001; Stringer 2006). Research needs to acknowledge that very rigorous evaluation methodology is not always achievable in this population, particularly when the intervention is carried out in a real life every day context. There is a paucity of language and communication intervention studies in this population and it is argued that studies that include elements of rigorous case study methodology are relevant in further understanding if and how language learning interventions are effective.

## Conclusions

The findings from the study support the implementation of phonological and semantic approaches to curriculum vocabulary learning for primary school age children with [EBDSEBD](#). The study shows that children with [EBDSEBD](#) can participate in these interventions and indicate that they have the potential to be effective across children with [EBDSEBD](#). More needs to be known about language development in children with [EBDSEBD](#) and if and how early language development contributes to how these children engage in learning and their academic attainment.

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Tables

Table 1 Outline of the Phonological Awareness Intervention

Pre-Intervention		Intervention		Post-Intervention	
Week 1 Baseline Assessment 1	Week 2 Baseline Assessment 2	Week 3 Intervention	Week 4 Intervention	Week 5 Baseline 3	Week 9 Baseline 4
Phoneme Awareness Task Syllable Awareness Task Rhyme Task Auditory Memory Task	Phoneme Awareness Task Syllable Awareness Task Rhyme Task Auditory Memory Task	2 sessions	2 sessions	Phoneme Awareness Task Syllable Awareness Task Rhyme Task Auditory Memory Task	Phoneme Awareness Task Syllable Awareness Task Rhyme Task Auditory Memory Task

Table 2 Outline of the Curriculum Vocabulary Intervention

Pre-Intervention		Intervention			Post-Intervention	
Week 1 Baseline Assessment 1	Week 2 Baseline Assessment 2	Week 3 Intervention	Week 4 Intervention	Week 5 Intervention	Week 6 Baseline 3	Week 10 Baseline 4
6 target words 6 control words	6 target words 6 control words	2 sessions	2 sessions	2 sessions	6 target words 6 control words	6 target words 6 control words

Table 3 Target and control curriculum vocabulary words selected for the participants

	Target Words (6)	Control Words (6)
Participant		
P1	bungalow, semi-detached, terraced, theatre, palace, lighthouse	cottage, windmill, campervan, power-station, factory, apartment
P2	cathedral, university, semi-detached, theatre, palace, bungalow	mansion, warehouse, cottage, factory, apartment, campervan

P3	bungalow, semi-detached, terraced, theatre, palace, lighthouse	mansion, warehouse, cottage, factory, apartment, windmill
P4	cathedral, university, semi-detached, theatre, palace, bungalow	mansion, warehouse, cottage, factory, apartment, power-station
P5	bungalow, semi-detached, cathedral, theatre, palace, lighthouse	cottage, windmill, campervan, power-station, factory, apartment



Table 4 Language and Literacy Profiles of the Participants

Participant	Age	Receptive Language			Expressive Language		National Curriculum Level Writing	National Curriculum Level Reading
		BPVS-II	TROG-2	CELF-LP	CELF-FS	CELF-RS		
P1	7;02	95	106	8	7	3	1C	1A
P2	7;02	71	69	5	3	3	P6	P7
P3	6;01	76	74	9	8	4	Not available	Not available
P4	6;0	75	79	7	5	4	Not available	Not available
P5	8;03	85	90	7	3	7	P8	1B

BPVS-II British Picture Vocabulary Scales (Dunn et al., 1997).

TROG-2 Test for the Reception of Grammar – Version 2 (Bishop 2003)

CELF-LP Clinical Evaluation of Language Fundamentals -UK<sup>4</sup> – Listening to Paragraphs subtest (Semel et al., 2006)

CELF-FS Clinical Evaluation of Language Fundamentals - UK<sup>4</sup> – Formulating Sentences subtest (Semel et al., 2006)

CELF-RS Clinical Evaluation of Language Fundamentals - UK<sup>4</sup> – Recalling Sentences subtest (Semel et al., 2006)

Table 5 Participants' scores on the baseline and post intervention phonological awareness and auditory memory measures

	Time 1/Baseline 1 Week 1	Time 2/Baseline 2 Week 2	Time 3 Post Intervention 1 Week 5	Time 4 Post Intervention 2 Week 9
<b>Participant 1</b>				
Initial Phoneme Identification	4	4	5	5
Syllable Count	1	1	4	5
Rhyme Generation	3	3	5	5
Total	8	8	14	15*
Auditory Memory	6	6	6	6
<b>Participant 2</b>				
Initial Phoneme Identification	3	2	5	5
Syllable Count	1	1	5	5
Rhyme Generation	1	1	5	5
Total	5	4	15	15**
Auditory Memory	5	5	6	5
<b>Participant 3</b>				
Initial Phoneme Identification	4	4	5	5
Syllable Count	2	2	4	5
Rhyme Generation	0	0	5	5
Total	6	6	14	15**
Auditory Memory	5	5	5	5
<b>Participant 4</b>				
Initial Phoneme Identification	3	3	5	5

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Syllable Count	1	0	4	5
Rhyme Generation	0	0	4	4
Total	4	3	13	14**
Auditory Memory	4	4	4	4
Participant 5				
Initial Phoneme Identification	2	2	5	5
Syllable Count	1	1	5	5
Rhyme Generation	0	0	5	5
Total	3	3	15	15**
Auditory Memory	5	5	5	5

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001

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Table 6 Participants' scores on the baseline and post intervention measures for the target and control words

Measure	Time 1 Baseline 1 Week 1			Time 2 Baseline 2 Week 2			Time 3 Post Intervention 1 Week 6			Time 4 Post Intervention 2 Week 10		
	SK	IP	SC	SK	IP	SC	SK	IP	SC	SK	IP	SC
Participant 1												
Target Words	0/6	5/6	3/6	0/6	5/6	3/6	6/6	6/6	6/6	6/6	6/6	6/6
Control words	0/6	5/6	2/6	0/6	5/6	2/6	0/6	5/6	2/6	0/6	5/6	2/6
Participant 2												
Target words	0/6	2/6	2/6	1/6	3/6	2/6	6/6	6/6	5/6	6/6	6/6	6/6
Control words	0/6	1/6	1/6	0/6	1/6	0/6	0/6	2/6	2/6	0/6	2/6	2/6
Participant 3												
Target words	0/6	2/6	1/6	0/6	2/6	2/6	6/6	6/6	6/6	6/6	6/6	6/6
Control words	0/6	2/6	1/6	0/6	2/6	2/6	0/6	3/6	2/6	0/6	3/6	2/6
Participant 4												
Target words	0/6	3/6	0/6	0/6	2/6	0/6	6/6	6/6	6/6	6/6	6/6	6/6
Control words	0/6	2/6	0/6	0/6	2/6	0/6	0/6	2/6	0/6	0/6	2/6	0/6
Participant 5												
Target words	0/6	1/6	0/6	0/6	1/6	0/6	6/6	6/6	6/6	6/6	6/6	6/6
Control words	0/6	0/6	1/6	0/6	0/6	1/6	0/6	0/6	2/6	0/6	1/6	1/6

SK: Semantic Knowledge; IP: Initial Phoneme Identification; SC: Syllable Count

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## Appendix 1 Phonological awareness measure

### Task 1: Initial Phoneme Identification

Instruction to the participant: 'I'm going to show you some pictures and tell you what each one is. Each time I say a word. I would like you to tell me what the first sound in the word is.

For example, if I said 'tap' the first sound would be 't'.

	Word	Correct Response
1.	Pen	'p'
2.	Tank	't'
3.	Ship	'sh'
4.	Frog	'f'
5.	Strawberry	's'

1 point is scored for each initial phoneme correctly identified. The initial clusters 'fr' and 'str' in items 4 and 5 were not accepted as these are classed as the onset of the words, as opposed to the initial phoneme.

### Task 2: Syllable Count

Instruction to the participant: 'I'm going to show you some more pictures. This time, I would like you to say the word after me, and clap along to the beats in the word. For example, 'table' has two beats' (researcher then clapped out the two syllables in 'table').

	Word	Correct Response
1.	Dog	1 clap
2.	Finger	2 claps
3.	Aeroplane	3 claps
4.	Caterpillar	4 claps
5.	Helicopter	4 claps

1 point is scored for each word where the participant claps the correct number of syllables. Responses are also counted as correct if the participant says the correct number instead of clapping out the number of syllables.

### Task 3: Rhyme Generation

Instruction to the participant:

'I'm going to say a word. After each word, I would like you to think of some other words that rhyme with the word I say. The words don't have to be real words; you can make up a word as long as it rhymes with the word I say. For example, 'table' rhymes with 'stable' and 'able'.

	Word	Correct Response
1.	Car	Structure ending with 'ar'
2.	Grass	Structure ending with 'as'
3.	Shirt	Structure ending with 'irt'
4.	Snail	Structure ending with 'ail'
5.	Church	Structure ending with

		'ch'
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## Appendix 2 Selected examples of activities used in the phonological awareness intervention

The intervention consisted of four sessions, lasting for 20 to 30 minutes. Four sessions were completed over a two week intervention period. The first three sessions followed a structure where the complexity of the activities increased as the sessions progressed. The fourth and final session consisted of activities designed to further consolidate syllable awareness and onset-rime skills. Explanations, modelling, prompts and scaffolding were all techniques used in the intervention.

### Initial Phoneme Identification Activities

#### Odd one out

Three words were presented verbally with accompanying pictures. The child was asked to listen carefully to the first sound in the words and identify the 'odd one out'.

Example: key, desk, cup

#### Sorting activity

Three boxes were laid out on a table labelled 'p', 't' and 's'. Three words were presented verbally with an accompanying picture. The child was asked to place each picture in the correct box.

Example: pan, sun, tap

'pan' should be placed in the box labelled 'p'

#### Production activity

The child was asked to think of words that began with the sound spoken by the researcher.



Example: 's' – any words beginning with 's'

### Syllable Awareness Activities

#### Activity Odd one out

Three words were spoken with accompanying pictures. The child was asked to listen carefully to how many parts/syllables each word has and identify which word was the 'odd one out'.

Example: lock, bed, saucepan

#### Activity Sorting activity

Three boxes were laid out on the table labelled '1', '2' and '3' to represent the number of syllables. Each word was spoken with an accompanying picture. The child was asked to place each picture in the correct box.

Example: 'blanket' should be placed in the '2' box

#### Activity Production activity

The child was asked to repeat the word spoken by the researcher and clap along to the parts/syllables in the word.

Example: carpet – 2 claps

### Rhyming Skill Activities

#### Activity Nonsense words

The child was presented with a number of written single phonemes (onset) and a word ending (rime). The child was asked to generate nonsense rhyming words by putting phonemes in front of the word ending.

Single phonemes used: 'p', 'd', 't', 'm', 'b', 's', 'sh'

Word endings: ‘-ell’, ‘-ot’, ‘-amp’

Activity Listening to rhyming words

The researcher spoke aloud a list of words. The child was asked to remain standing until they heard a word that did not rhyme with the others.

Example: bee, flea, sea, key, boat