



The effectiveness of a parent-implemented, phonological awareness programme on the phonological awareness skills of preschool children

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Abstract

A child's early literacy and language skills are the most reliable predictor of future academic achievement. Despite vast amounts of research supporting this link, many children start formal schooling with low early literacy skills. Without intervention or support, these children will likely continue to fall behind their peers. This exploratory study investigated the effectiveness of a parent-led phonological awareness programme ($n=3$), implemented at home with their 4-year-old children ($n=4$) in Christchurch, New Zealand. This study used an exploratory case study mixed methods design. The programme focused on improving children's phonological awareness skills by providing parents with readily available activities which taught a range of phonological skills. Parents were supported throughout implementation by the researcher with coaching and modelling. Overall, the study found parents to be effective at implementing the phonological awareness programme and facilitating the development of their children's emergent literacy skills. Children demonstrated increased phoneme identification, blending and segmenting skills and additional skills not explicitly taught, such as phoneme manipulation. Participation in the programme also positively affected children's interest in literacy activities, such as reading and writing. Parent reports identified positive effects on children's articulation, speech, engagement and overall confidence. Parents were positively affected by their participation in the programme, with reports of increased confidence in their English proficiencies and literacy skill development.

Keywords Early literacy · Phonological awareness · Emergent literacy skills · Parent-implemented

1 Introduction

The acquisition of early literacy and language skills is one of the most crucial developments in childhood. These skills underpin later literacy knowledge and children's ongoing ability to learn, communicate and understand the world around them (Beck et al., 2002,

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2008; de Witt & Lessing, 2016; Gillon et al., 2019). Despite the critical role that early literacy and language skills play in future development, many children start formal education with low levels of these skills. The gap between children with and without these skills increases throughout their schooling if intervention does not occur (Lonigan et al., 2013; Marulis & Neuman, 2013). This can have spinoff effects, causing difficulties in later educational experiences that extend into adolescence and adulthood (Marulis & Neuman, 2010, 2013; Ogg et al., 2012).

Emergent literacy refers to children's acquisition of language along a developmental continuum (McLachlan & Arrow, 2010). Emergent literacy includes knowledge of the alphabetic principle, print awareness, phoneme awareness and phonological awareness, expressive and receptive vocabulary and semantic knowledge (Whitehurst & Lonigan, 1998). These skills and forms of knowledge accumulate over time, emerging in the early years and increasing once a child begins school. In the early years, emergent literacy develops through a child's exposure to social interactions and contexts, rather than formal instruction. As such, children's early literacy environments, at home and kindergarten, play a crucial role in developing these early skills (Hart et al., 2009; Petrill et al., 2010). Proficient literacy skills in oral language, and for decoding, is critical for children once they transition from 'learning to read' to 'reading to learn', as the focus shifts to using skills to acquire knowledge on other topics (Westerveld et al., 2015). Literacy programmes can help bridge the gap; however, these programmes often favour trained professionals, such as specialist teachers, trained researchers or speech and language therapists (Marulis & Neuman, 2010). These individuals are often viewed as the most qualified and, therefore, the most successful at improving children's outcomes. Recent educational practices and policies, however, are putting increased emphasis on the important role that parents and caregivers play in facilitating their children's learning and educational development (Burgoyne et al., 2018; Pergar & Hadel, 2021).

The simple view of reading (SVR), theorised by Gough and Tunmer (1986), describes reading comprehension as the product of word-level decoding and linguistic comprehension (reading comprehension = decoding × linguistic comprehension). Reading success comes from the interaction between the two aspects (Savage et al., 2015). The validity of this cognitive model has been supported by significant amounts of research (Catts et al., 2005; Foorman et al., 2015; Johnston & Kirby, 2006). Despite its name, Gough and Tunmer (1986) do not mean that learning to read is a simple process. Word decoding and linguistic comprehension are highly complex features, encompassing smaller linguistic skills and processes. These processes were expanded by Tunmer and Hoover (2019) through their Cognitive Foundations Framework. This hierarchical framework builds on the SVR model to demonstrate the developmental processes and subskills undertaken to achieve reading comprehension and the direct and indirect influences that can affect it. These include meaning-related skills, such as vocabulary knowledge, oral language and grammatical ability (Tunmer & Hoover, 2019; Westerveld et al., 2015). It also encompasses code-related skills, such as alphabet knowledge, phoneme awareness and phonological awareness (Lonigan et al., 2013; Tunmer & Hoover, 2019; Whitehurst & Lonigan, 1998). Code-related skills facilitate children's capability to obtain the alphabetic principle and, thus, are imperative to children's ability to become effective decoders of written text (Lonigan et al., 2013). Meaning-related skills, predominantly associated with language, contribute to comprehension once the text is decoded (Westerveld et al., 2015).

Several components make up a child's code-related ability, including the understanding of the alphabetic principle, phoneme-grapheme correspondence and phonological and phonemic awareness. Ehri (1995) describes four stages children progress through in their understanding of the alphabetic principle, including pre-alphabetic, partial alphabetic, full alphabetic and consolidated alphabetic. Moving through these phases, children

develop their skill incrementally, from using letter visual cues to ‘read’ sight words, to making connections between letters and their corresponding sounds, to making complete connections between letters and their sounds to sound out and decode most words, and to full knowledge of sight words, and lastly, children use larger word chunks over individual phonemes to read sight words. In preschool-aged children, research has shown that phonological awareness is the most important emergent literacy skill to develop and is the best early predictor for later reading success (de Witt & Lessing, 2016; Lonigan et al., 2013; Sensenbaugh, 1996). Phonological awareness encompasses the ability to recognise and manipulate larger units of words such as rhyme and alliteration, while phonemic awareness is the specific ability to focus and manipulate individual phonological units or sounds (phonemes) that make up spoken words (O’Callaghan et al., 2016; Sensenbaugh, 1996). Adams (1990) describes five phonological awareness skills: rhyme and alliteration, compare and contrast sounds, blend and segment syllables, segment phonemes and phoneme manipulation (adding or deleting phonemes). Phonological awareness will be used throughout this article as an umbrella term to refer to both phonemic and phonological awareness skills (see Anthony & Lonigan, 2004; Gillon et al., 2019). These skills develop via implicit interactions and explicit instruction — such as hearing and producing rhyming words, or alliterative phrases in books and songs. Awareness of these units, particularly phoneme blending and segmentation, fosters the ability to encode and decode words and to hear and blend sounds, thus setting the foundation for subsequent literacy skills (Fielding-Barnsley & Hay, 2012; Harper, 2011; O’Callaghan et al., 2016). Children who commence school with low phonological knowledge often struggle to develop their literacy skills at the same rate as their peers (Ogg et al., 2012). A lack of phonological awareness skills upon entering primary school can lead to children falling behind academically and developing difficulties in decoding and understanding written language (Lonigan et al., 2013; Ogg et al., 2012).

Research demonstrates that children who struggle with their early literacy development in school have poorer educational and social outcomes (Gillon et al., 2019; Snowling et al., 2015; Stoeckel et al., 2013). They are at risk for antisocial behaviour, truancy and exclusion from school (Hudson et al., 2009). They may also experience poorer employment outcomes, poorer health and lifestyles and higher rates of criminal behaviour and intergenerational effects. Given the role of foundational skills in later development, intervention programmes are required to foster and improve at-risk children’s emergent literacy skills including phonological awareness skills. Children who are at risk for their literacy development are often less prepared to start school, which can threaten their future skill development and can lead to them falling behind their peers (Billard et al., 2010; Cunningham & Stanovich, 1997; Lonigan et al., 2013). Parents who struggle with their own literacy often do not have the skills to develop the literacy and language skills of their children. This has been shown through differences in vocabulary (Hart & Risley, 1995; Taylor et al., 2013), exposure to literacy activities (O’Connor et al., 2009) and even the frequency and choice of which books parents read to their children (Aram & Aviram, 2009).

During the formative years, the relationship that develops between children and parents or caregivers builds a child’s emerging knowledge of the world and educational beginnings (Hart & Risley, 1995; Stewart, 2012; Weisleder & Fernald, 2013). Early literacy skills are developed implicitly through everyday interactions, such as shared reading and play, as well as through parents’ explicit instruction of topics such as names of colours, shapes, vehicles or animals (Stewart, 2012). Parents’ own literacy skills and practices also play a major influence on their child’s attitudes towards literacy and future reading habits (Buckingham et al., 2013; Pergar & Hadela, 2021). Research has found that parent-delivered early literacy interventions can significantly improve children’s language, literacy

development and educational gains (Burgoyne et al., 2018; de Witt & Lessing, 2016; Pratt et al., 2015; Sénéchal & Young, 2008).

In a recent study, Burgoyne et al. (2018) evaluated the effectiveness of a parent-delivered early language enrichment programme for preschool-aged children. They conducted a randomised control trial with 208 children living throughout the UK. They found that children who received the parent-delivered language programme made significant improvements in their language and narrative skills. These gains were maintained 6 months post-test, when they also scored higher on measurements of early literacy. These results are supported by research by de Witt and Lessing (2016), Niklas and Schneider (2017), Pratt et al. (2015) and Sénéchal and Young (2008).

In their meta-analysis, Sénéchal and Young (2008) reviewed 16 parent–child literacy intervention studies. They found parental involvement had a positive effect on children’s literacy and reading acquisition from kindergarten to third grade. Interventions that involved tutoring in specific literacy activities produced more significant gains compared to interventions only requiring reading to or reading by children. They also found that interventions requiring parents to explicitly teach a range of skills may have broader outcomes and long-term effects. These included spinoff effects, such as the development of parents’ personal literacy skills in parallel with their children. Furthermore, in these interventions’ children were actively engaged, compared to passive interventions where there was less collaboration between parent and child.

The current study sought to further understand the role parents can play in facilitating the early literacy and language development of their preschool children. This was accomplished through a parent-implemented, phonological awareness programme focusing on developing preschoolers’ foundational phonological awareness skills. This study included four children and their three mothers. The programme was designed to improve children’s word-decoding skills through phonological awareness activities. The programme separated itself from other early literacy and language programmes by being implemented within the home by parents, instead of by trained professionals who were typically utilised in other literacy programmes such as Read it Again (Justice & McGinty, 2009) and The Incredible Years (Webster-Stratton & Reid, 2004). The programme was designed to provide parents with literacy activities and games which could be readily implemented during everyday activities. Specifically, this study addressed the following question:

- Can a parent-delivered phonological awareness programme, implemented in the home environment, foster the development of phonological awareness skills of 4-year-old children?

2 Method

2.1 Participants

The research was an exploratory case study underpinned by a mixed-methodology design, using both quantitative assessments and qualitative parent reports from interviews (Tashakkori & Teddlie, 1998). Participants were recruited from a single urban kindergarten in Christchurch, New Zealand. Kindergarten staff were asked to put forward students who met the age criteria of turning four in the 3 months before the study commenced; this criterion was used to ensure the children did not start formal school

during the programme. This study included four children, one female (Sarah) and three males (Aarav, Daniel and James) and their three mothers (Sarah and Aarav are twins). Pseudonyms are used for all participating children. There were significant recruitment challenges for this project due to circumstances within the city in which the research was taking place. As only three families were recruited, an exploratory case study design was chosen in favour of having a control group. This project met the institution's educational ethics committees' requirements.

2.2 Assessments

Children were measured at four time points: screening, pre-programme (Week 0), post-programme (Week 7) and at a follow-up 8 weeks after the completion of the programme (Week 15). All testing was completed at the children's kindergarten. Children were measured on a variety of early literacy skills described below.

Initially, this programme was designed as an emergent literacy programme to develop children's vocabulary and phonological awareness skills. To understand children's baseline emergent literacy skills, the following assessments were conducted during the screening process. Children's preliminary vocabulary was measured using the British Picture Vocabulary Scale 3rd edition (BPVS) (Dunn & Dunn, 2009). This measure was utilised during the pre-programme assessment only. The BPVS (Dunn & Dunn, 2009) is a vocabulary assessment which can measure the receptive vocabulary of children from three to 16 years of age. Children were given a target word then shown four pictures and asked to select the picture they thought best fit with the target word.

The CELF-P2 (Semel et al., 2006) was used as a descriptive measure of children's initial language skills during the pre-programme assessment only. This assessment was selected over others, including the Preschool Language Scales Fifth Edition (PLS-5) (Zimmerman et al., 2011) as the study originally focused on the children instead of the parents. All assessments were completed in an early childcare education context. The CELF-P2 (Semel et al., 2006) assesses the phonological awareness and phoneme awareness skills taught within the programme, including rhymes, blends, sounds and syllables. The assessment was only used as a descriptive measure of children's baseline literacy skills and was viewed to be suitable for this research. The following subtests were administered orally: word structure, sentence structure, expressive vocabulary and recalling sentences. For word structure, children were required to complete a statement read by the researcher using the correct word structure. For sentence structure, children were asked to select the picture out of four options that correctly represented a sentence. For expressive vocabulary, children were asked to name the item/action in a series of pictures. For recalling sentences, children were asked to repeat a sentence read by the researcher. The CELF-P2 has good psychometric properties. Test-retest reliability coefficients are above 0.78, and internal consistency is above 0.80 across subtests (Black et al., 2020). Raw scores collected for analysis were converted into scaled scores (a score of 7–13 indicates performance in the expected range for a child's age).

The children's mean scaled score on the BPVS was 111.8; this score placed them slightly over the expected average for their age (scaled scores within the expected age range are 85–111). The expressive vocabulary subtest from the CELF-P2 demonstrated a mean scaled score of 10.8, sitting well within the expected range of 7–13. Due to these scores sitting within the expected range, it was decided by the researchers to exclude

Table 1 Summary of children's initial literacy skills

Measure	Baseline
	M (SD)
Age (months)	51.8 (1.3)
Recalling sentences ^a (raw)	16.0 (9.3)
Recalling sentences ^a (scaled ^b)	9.5 (5.5)
Sentence structure ^a (raw)	15.0 (3.0)
Sentence structure ^a (scaled ^b)	10.5 (2.2)
Word structure ^a (raw)	15.8 (4.8)
Word structure ^a (scaled ^b)	11.5 (3.0)
Expressive vocabulary ^a (raw)	19.5 (5.9)
Expressive vocabulary ^a (scaled ^b)	10.8 (2.4)
BPVSc (raw)	71.3 (11.1)
BPVSc (scaled ^d)	111.8 (9.0)

^aClinical Evaluation of Language Fundamentals–Preschool (CELF-P2) subtest

^bScaled score: scores of 7–13 are within the expected range for a child's age

^cBritish Picture Vocabulary Scale 3rd edition

^dScaled score: scores of 85–111 are within the expected range for a child's age

the vocabulary portion of the proposed emergent literacy programme and instead solely focus on developing children's phonological awareness skills. This descriptive data is presented in Table 1.

Phonological awareness was measured using two assessments, which were conducted at all three time points. The first was the Computer Based Phonological Awareness Assessment Tool (CBPAT) (Carson et al., 2013). The CBPAT has good psychometric properties. Test–retest reliability coefficients are 0.70 or above for all subtests. This assessment was chosen due to its focus on a New Zealand population and ease of usability for preschool-aged children. Raw scores were collected for the following subtests phoneme identification, phoneme blending and phoneme segmentation. For phoneme identification, children were asked to identify the word which started with a target sound. For phoneme blending, children were asked to blend sounds to form a word and select the corresponding picture. In the current study, phoneme segmentation was adapted for use and children were asked to segment a word, read orally by the researcher, into its constituent phonemes, instead of naming the number of phonemes within a target word.

The second measure was the Comprehensive Test of Phonological Processing 2nd edition (CTOPP2) (Wagner et al., 2013). The CTOPP2 (Wagner et al., 2013) has test–retest reliability correlations for the core subtests above 0.75. The phonological awareness composite score was used from the following subtests: elision, blending and sound matching. For elision, children were required to manipulate words by deleting or adding syllables and individual phonemes. For blending, children listened to a pre-recorded voice through headphones which asked them to blend segmented words. For sound matching, children were asked to identify the correct picture from three options that started or ended with a given phoneme.

2.3 Procedure

The phonological awareness programme included 6 weeks of phonological awareness training implemented by parents. The programme was implemented for 20 min a day, 5 days a week, for a total of 100 min a week. The 20-min sessions could be broken up into smaller portions of time (5 or 10 min). The activities within the programme were designed to be undertaken with just the child involved in the research. Still, they were inclusive of others, such as siblings, friends or other family members, to ensure ease of implementation into daily life.

Previous research (e.g. Skibbe et al., 2011) found that mothers could not provide consistent levels of support to aid their child's development of literacy skills, due to a lack of support or understanding of the programme, and the frequency of coaching mothers received decreasing throughout the programme. To support their implementation of the programme, parents participated in fortnightly one-on-one coaching sessions with the researcher, and follow-up phone calls on alternative weeks. Supporting parents throughout the programme and making it functional to family's lives, sought to increase parents' overall consistency and commitment to the programme.

Sessions involved parents being coached through the contents of the programme for the following 2 weeks. A pre-prepared instructional sheet was utilised to ensure consistency around programme implementation. It included the modelling of example activities and ways to incorporate activities into different contexts. Parents were encouraged to ask questions and to discuss aspects of interest from previous weeks during coaching sessions. The initial coaching session lasted 45 min with subsequent sessions lasting approximately 30 min. Parents were called every alternative week for a follow-up. These calls lasted an average of 10 min. If parents did not answer the phone, they were sent a text and called at a time determined by the parent. Parents participated in, on average, a total of 195 min of in-person coaching and support and 60 min of virtual coaching and support via phone.

Parents participated in a semi-structured interview with the researcher after the completion of the follow-up assessment (Week 15). The interview sought to gain parents' feedback on the programme and insight into their children's development. Interviews lasted an average of 30 min. The interviews explored aspects, including how the programme worked within their family, any challenges parents encountered and changes parents had observed in their child's literacy or language development.

2.4 Phonological awareness programme

The phonological awareness programme used in this study was created and developed by the researcher, using a range of research articles, books, parent and teachers' manuals, webpages and existing literacy and language programmes to determine important early literacy skills and their developmental trajectory (Adams et al., 1998; Gillon, 2001; Justice & McGinty, 2009; Logsdon, 2019; MacDonald & Figueredo, 2010; University of Oregon Center on Teaching and Learning, 2019; Terrell and Watson, 2018). Two key resources utilised were Terrell and Watson (2018) and Adams et al. (1998). Terrell and Watson (2018) describe the most appropriate, evidence-based phonological skills to teach preschool-aged children. These are syllabication, rhyming, phoneme blending, syllable and sound deletion, syllable and phoneme segmentation and phoneme identification. Adams et al. (1998) describe four phonological awareness skills children are projected to develop

in kindergarten that include the following: word level, being able to recognise how many words are in a sentence; syllable level, being able to blend and segment phonemes in words with at least three syllables; rhyme level, being able to understand, recognise and generate rhyming words; and sound level, being able to identify and isolate beginning and ending sounds in words, segment and blend sounds in words and change a sound in a word to make a new word in games and songs.

The basis of the programme was developing phonological awareness by teaching children how spoken words are made up of phonemes and how to manipulate, separate and combine these phonemes to create and decipher new words. Parents received developmentally appropriate target sounds for each week, based on the children's age (Lanza & Flahive, 2012), example words for these sounds, and activities for developing their phonological skills. Parents were not limited to the suggested sounds or words and were encouraged to use the programme and activities in a naturalistic way that worked best for their child and daily events. The programme was designed to be implemented during regular activities, such as driving, cooking or grocery shopping and play-based activities. Introducing short, literacy-based games into regular activities was designed to fit into family life while being flexible in implementation. Activities for each week were staggered, increasing in complexity. For example, the first activity for 1 week included 'I Spy' using initial phonemes, while the last activity for the week included 'Odd sound out' where the child was given three words, two that started with the same phoneme and one which did not, with the child identifying the odd word out. The phonological awareness programme aimed to develop phonological skills that were developmentally appropriate for children before formal literacy instruction (Fielding-Barnsley & Hay, 2012; Harper, 2011; O'Callaghan et al., 2016). The programme focused on the skills presented in Table 2.

2.5 Implementation fidelity

For fidelity purposes, parents were asked to complete daily checklists of their implementation of the programme and to audio record one session a week on a provided voice recorder. These checklists indicated that parents implemented the literacy programme for an average of 15 min a day, 6 days a week, for a total average of 90 min a week. This was slightly lower than the recommended 100 min per week.

3 Results

This study aimed to examine whether a parent-delivered, home-based phonological awareness programme could foster the development of phonological awareness skills in preschool children. Children's results are presented as four separate cases and will include results from assessments integrated with qualitative data collected from parents during the coaching sessions and the interview with parents.

3.1 Sarah

Table 3 displays Sarah's raw scores on the phonological awareness assessments. Sarah's pre-test results demonstrate she had some initial phoneme identification with a score of 6 on the CTOPP2 sound matching (SM) and 4 on the CBPAT initial phoneme identification

Table 2 Phonological awareness programme contents

Week	Skill	Example activity
1	Initial phoneme identification	<i>I Spy</i> : play I Spy using initial phonemes. (i.e. I spy with my little eye, something beginning with /b/—ball, bark, bus)
2	Final phoneme identification	<i>Matching Words</i> : find toys which ended with the same phoneme (i.e. //—ball, doll, tool, bell)
3	Rhyme	<i>Rhyme Tennis</i> : go back and forth listing words which rhyme with a target word (i.e. target word: bat. Rhyming words include: mat, cat, sat, hat, chat)
4	Alliteration	<i>Colour Game</i> : pick a colour (i.e.) blue and create words which start with the same initial phoneme (back, bin, bow)
5	Phoneme blending	<i>Robot Talk</i> : parents use a robotic voice to segment words (i.e. b-a-t) and child blends the word (i.e. bat)
6	Phoneme segmentation	<i>Jump the Word</i> : provide the child with a word (i.e. bin) and have them segment the word by jumping for each phoneme (i.e. b-i-n)

Table 3 Sarah's results on the phonological awareness assessments

	CTOPP2			CBPAT		
	EL ^a	BW ^b	SM ^c	IPID ^d	BL ^e	SG ^f
Pre-test	7	7	6	4	3	0
Post-test	13	16	6	9	10	5
Delayed post-test	15	16	11	8	13	7

^aElision. ^bBlending words. ^cSound matching. ^dInitial phoneme identification. ^eBlending. ^fSegmentation

(IPID) task. She also displayed some preliminary blending skills with a score of 7 on the CTOPP2 blending words (BW) task and 3 on the CBPAT blending (BL) task.

Between the pre-test and post-test, Sarah demonstrated an increase in her phoneme identification skills on the SM and IPID subtests. On the IPID task, she exhibited an increase from a pre-test of 4 to a post-test score of 9. On the SM task, Sarah maintained her initial score from the pre-test to the post-test with a score of 6; however, between the post-test and follow-up, she demonstrated an increase from 6 to 11. Sarah's mother reported that she loved participating in the programme. She expressed that Sarah especially loved phoneme identification and would often initiate activities from the programme with her brother and other adults outside of her parent's implementation.

Sarah demonstrated gains in her phoneme blending skills on both the BW and BL subtests. On the BW task, her score increased from 7 at pre-test to 16 at post-test, and this score of 16 was maintained at the follow-up. On the BL task, Sarah made gains, increasing from 3 at pre-test to 10 at post-test and 13 at the follow-up. Sarah also showed the development of her segmentation skills on the CBPAT segmenting (SG) subtest, increasing from 0 to 5 between the pre-test and post-test, with further gains demonstrated at the follow-up with a score of 7. Sarah's mother reported Sarah was not particularly interested in blending and segmenting initially and instead tried to turn activities towards skills she was confident in, such as initial phoneme and rhyme. However, as she became more confident in these skills, Sarah would independently initiate segmenting words throughout the day. During the post-test and follow-up assessments, the researcher noted that Sarah would segment out every word given to her in order to complete the task. Sarah demonstrated large gains in her phoneme deletion and manipulation skills as shown through the CTOPP2 Elision (EL) subtest. Her score increased from 7 at the pre-test to 13 at the post-test and 15 at the follow-up.

3.1.1 Additional outcomes

Sarah's mother reported that Sarah had always loved books and being read to, but since participating in the programme, there was a noted increase in Sarah's desire to read independently and to sound out short words during shared reading. 'Sarah will often make up stories for the pictures but she is able to identify and sound out short words. I will often leave gaps when reading books for them to figure out the word' — Sarah's mother. Sarah's mother also reported an improvement in Sarah's pronunciation and articulation of speech. These results suggest that Sarah engaged in and enjoyed the activities from the programme and felt sufficiently confident in her skills to initiate further development.

3.2 Daniel

Table 4 displays Daniel’s raw scores on the phonological awareness measures. Daniel showed varied results in his phoneme identification skills. On the IPID task, Daniel demonstrated a minimal increase from pre-test to post-test, increasing from 6 to 7. However, Daniel demonstrated gains on the SM task, increasing from 5 at pre-test and 6 at post-test to 14 at follow-up. Daniel’s mother reported he really enjoyed participating in the programme. She reported that Daniel quickly gained a lot of confidence in his phoneme identification and rhyme, so often initiated different ways of playing I Spy.

Daniel demonstrated gains in both his blending and segmenting skills. On the BW task, he showed an increase from 2 to 7 between the pre-test and post-test that increased to 12 at follow-up. On the BL task, he maintained a score of 8 between the pre- and post-test but increased to 11 at follow-up. Daniel’s segmenting skills showed a similar pattern on the SG task, with a score of 4 between the pre-test and post-test, which increased to 8 at the follow-up. Daniel’s mother reported Daniel was initially apprehensive about segmenting and tended to supply rhyming words in place of segmenting. However, towards the end of the week, he gained a lot of confidence and would happily segment given words. The researcher noted Daniel would segment every word given no matter the task from the post-test on. Daniel demonstrated gains in his phoneme deletion and manipulation through the EL task. His pre-test score of 9 showed some prior knowledge of this skill. From pre-test to post-test, he showed an increase of 9 to 14, with a further increase to 20 at follow-up.

3.2.1 Additional outcomes

Daniel’s mother reported Daniel had always enjoyed books but struggled sitting still long enough to fully engage. After participating in the programme, Daniel’s mother reported she had noticed a huge increase in his focus and engagement in literacy activities, i.e. he was now sitting down and ‘reading’ entire books and was more focused on colouring pictures and attempting to write short words, especially his name. ‘I saw an increase in his interest in identifying letters in his name in books and writing the letters.’ — Daniels’ mother. Daniel also started to engage with audiobooks, sitting down and listening to the entire story, whereas prior to the programme he would get distracted quickly. His mother also noted that Daniel was not stuttering as much as he had previously. Daniel’s mother found the programme especially beneficial during an overseas holiday as she was able to implement activities during downtime in airports, aeroplanes,

Table 4 Daniel’s results on the phonological awareness assessments

	CTOPP2			CBPAT		
	EL ^a	BW ^b	SM ^c	IPID ^d	BL ^e	SG ^f
Pre-test	9	2	5	6	8	4
Post-test	14	7	6	7	8	4
Delayed post-test	20	12	14	7	11	8

^aElision. ^bBlending words. ^cSound matching. ^dInitial phoneme identification. ^eBlending. ^fSegmentation

hotels and restaurants. These results suggest participation in the programme had a beneficial influence on Daniel's engagement and interest in writing. This is consistent with research by Brennan and Ireson (1997), who found phonological awareness activities to positively affect children's writing ability.

3.3 James

Table 5 displays James' raw scores on the phonological awareness assessments. James demonstrated increases in his phoneme identification skills through both the SM and IPID tasks. On the IPID task, he increased his score from 3 to 6 between the pre- and post-test. On the SM, James increased from 2 at pre-test to 5 at post-test. Both subtests demonstrated a decrease between post- and follow-up tests, with scores of 2. James was a shy child who often struggled with assessment tasks that required a verbal response. James' mother reported that he was very apprehensive initially about participating in activities from the programme. During the first catch-up after Week 1, she noted that he had not been able to correctly identify any initial phonemes. With her perseverance, he became a lot more engaged and began initiating games.

James demonstrated varied blending skills. On the BW task, he scored 2 at pre-test, and 0 at post-test and follow-up. On the BL task, he made minimal gains from pre-test to post-test, increasing from 3 to 4; however, James showed a larger increase scoring 8 at the follow-up. James did not demonstrate any development of his segmentation skills, although increases in his ability to manipulate phonemes on the EL task were evident from 2 at pre-test to 6 at post-test and 8 at follow-up.

3.3.1 Additional outcomes

James' mother reported that she had noticed an increase in his confidence and speech across the programme, as well as an increased interest in books and writing. 'Before the programme, he was not interested in books at all, did not even want to be read books. Would not pick up or touch books. Now he is picking up books, identifying the letters from his name in words and making up his own stories from the pictures.' — James' mother. She reported in social situations with unknown adults, James would usually hide, but in the post-programme, he was a lot more confident and was talking to and interacting with them. These results suggest that participation in the programme positively influenced James' oral language and subsequently self-esteem and confidence. This is consistent with research by Hisken (2011) and Primavera (2000), who found an increase in children's self-esteem and confidence after participation in emergent literacy activities.

Table 5 James results on the phonological awareness assessments

	CTOPP2			CBPAT		
	EL ^a	BW ^b	SM ^c	IPID ^d	BL ^e	SG ^f
Pre-test	2	2	2	3	3	0
Post-test	6	0	5	6	4	0
Delayed post-test	8	0	2	2	8	0

^aElision. ^bBlending words. ^cSound matching. ^dInitial phoneme identification. ^eBlending. ^fSegmentation

3.4 Aarav

Table 6 displays Aarav's raw scores on the phonological awareness measures. Aarav showed varied results in his phoneme identification skills. At pre-test, Aarav scored highly on the SM task with a result of 15 (an age equivalent of 5 years, 9 months). Aarav demonstrated a decrease between pre- and post-test to 9, and 8 at follow-up. On the IPID task, he demonstrated an increase from 6 at pre-test to 9 at post-test; however, at follow-up, this decreased to 4. Aarav's mother reported he loved participating in the programme. Aarav would often initiate phoneme identification activities with his sister and parents.

Aarav demonstrated gains in his blending skills, with his scores on the BW task increasing from 9 at pre-test to 15 at post-test and 21 at follow-up. On the BL task, his score increased from 5 at pre-test to 9 at post-test and then 14 at follow-up. At pre-test, Aarav scored 0 on the SG task, which increased to 3 at post-test and 6 at follow-up. Aarav's mother reported Aarav initially did not want to participate in the blending or segmenting activities and would often refuse to do some of the games, instead, bringing sessions back to his favourite games, such as phoneme I Spy. Once he had had more practice, however, he began to segment and blend short words found in books.

Aarav did not show any gains on the EL task, maintaining a score of 9 across all three assessment points. This suggests that he had some prior knowledge of phoneme deletion and manipulation; however, no growth was evident during the programme or at follow-up.

3.4.1 Additional outcomes

Aarav had always enjoyed being read to and writing (scribbles); however, since participating in the programme, his mother reported an increase in his desire to read independently, sounding out short words and making up stories to the pictures and words he could read. 'He is reading books by himself by making up stories to the pictures. He is able to identify three-letter words that he knows and sound them out and attempts longer words.' — Aarav's mother. She also reported that he was practising writing letters and copying words from books. These findings suggest that participation in the programme positively influenced Aarav's interest and confidence in literacy-based activities, especially writing. This is consistent with findings from Hisken (2011) and Primavera (2000).

3.5 Parent outcomes

An unexpected outcome of this programme included benefits that parents reported regarding their own literacy and language skills. Specifically, parents reported that they

Table 6 Aarav's results on the phonological awareness assessments

	CTOPP2			CBPAT		
	EL ^a	BW ^b	SM ^c	IPID ^d	BL ^e	SG ^f
Pre-test	9	9	15	6	5	0
Post-test	9	15	9	9	9	3
Delayed post-test	9	21	8	4	14	6

^aElision. ^bBlending words. ^cSound matching. ^dInitial phoneme identification. ^eBlending. ^fSegmentation

had no knowledge of what a phoneme was, or the benefits of teaching their children to segment and blend words. The programme was able to teach literacy skills parents were unaware of and provide basic activities and games for them to use which taught these skills to their children.

4 Discussion

The findings from this exploratory study suggest that a parent-delivered, home-based phonological awareness programme has the potential to foster the phonological awareness of 4-year-old children. All four participants demonstrated increased knowledge of the phonological skills taught within the programme. Children also demonstrated development in more complex phonological processes not explicitly taught within the programme such as elision which consists of phoneme manipulation through deletion and addition, although variability in children's development was identified.

Children varied in the type and degree to which they demonstrated gains in phonological skills. All children demonstrated an increase in their phoneme identification skills. For some children, this increase was only established between pre-test to post-test, while other children continued to make gains at follow-up 8 weeks after the completion of the programme.

Increased gains in phoneme blending and segmentation were demonstrated throughout the phonological awareness programme. These are more advanced skills and were taught in the final 2 weeks of the programme. Results suggest that the development of these skills occurred to a lesser extent than for phoneme identification. Interestingly, children continued to develop these skills between the post-point and the follow-up. Although not asked to, all of the parents reported that they continued to do activities from the phonological awareness programme throughout the 8 weeks between the post-test and follow-up. This finding suggests that the development of higher-level skills, such as blending and segmentation may benefit from additional practice. A longer period of development for segmenting and blending is supported in the literature (Anthony & Francis, 2005) given children have to develop their phoneme identification and isolation skills before they can manipulate phonemes, whereas phoneme identification and rhyme are easier skills to develop. Overall, these results support the development of phoneme blending and segmentation skills at a young age, notably, even younger than the cohort of children who participated in research by Gillon et al. (2019) who were in their first year of formal education.

Findings also suggest that the programme may be useful in developing wider phonological skills, including phoneme manipulation and deletion skills. In the current study, these skills were not explicitly included as part of the programme, which suggests a transfer effect may have occurred between foundational phonological awareness skills and higher-level phonological skills. This aligns with similar transfer effects found in other research on phonological awareness programmes (see Torgesen et al. (2001), Fälth et al. (2017), Werfel et al. (2016)), although children in the current study were younger than those in previous research. In Fälth et al. (2017), a transfer effect was found with 6-year-old children and Torgesen et al. (2001) observed a transfer effect with children who were 8–10 years old. The results from this study, therefore, suggest that children can be supported to develop higher-level phonological skills at younger ages than typically reported.

Parents reported additional outcomes from participation in the programme — children had increased confidence, articulation, speech development, concentration and engagement in literacy-based activities (i.e. reading, writing and listening to audiobooks). Parents

reported increases in children wanting to be read to, reading independently, sounding out short words, writing their name and other short words, and being more engaged in reading and writing activities. As the phonological awareness programme was orally based, this suggests increasing children's oral literacy and language skills may increase their desire to transfer these skills to print (Brennan & Ireson, 1997). Active participation in oral-based activities as utilised in the programme may support the development of reading and writing skills, linguistic comprehension and word decoding skills, influencing overall reading and writing ability (Adams et al., 1998; Brennan & Ireson, 1997; Gough & Tunmer, 1986; Tunmer & Hoover, 2019).

A strength of this study was the explicit guidance of skills and support provided to parents during the intervention period. All parents reported that without the coaching sessions, ongoing support and modelling, they would not have felt as confident in their implementation of the programme. Providing ongoing support was the primary goal of the coaching sessions within the phonological awareness programme. It was postulated that by supporting, motivating and encouraging parents' implementation of the programme, they would feel more confident in their abilities, leading to increased enjoyment and frequency of implementation. Two parents reported feeling deficient in their own literacy and language skills prior to the programme which may have impeded them from developing their children's skills. With the development of parents' skills and increased knowledge of how to teach these skills within everyday activities, parents felt better positioned to enhance their children's literacy and language skills (Hisken, 2011). Future research within this area should explore explicitly developing parents' literacy and language skills, and supporting them in this area during the implementation of literacy programmes. Enhancement of parents' own literacy and language development, in conjunction with knowledge of literacy skills and techniques, may also support children's literacy and language skill development long-term. Future research should also examine the effects of implementing and participating in emergent literacy programmes on the literacy practices of parents and children.

A limitation of this exploratory case study was the small number of participants. This project encountered substantial recruitment challenges. The study was conducted while a significant amount of other research was being undertaken in Christchurch early childcare centres and in the wake of the Christchurch mosque attacks, both of which could have contributed to a general reluctance to participate. An exploratory case study that utilised a mixed-methods design was selected as it relates to both quantitative assessments, as well as qualitatively through real-world outcomes. However, a positive outcome of the small sample size was that the researcher was able to create stronger relationships with the families, which may have contributed to an increase in parental adherence and openness about individual's personal literacy outcomes. Future research should look at replicating the study with a larger sample size, a control group and assessing long-term outcomes once children start formal education.

Existing intervention research has typically focused on programmes aimed at children's emergent literacy and language skills. Previous research has found that this approach works for many children (Gonzalez et al., 2014; Harper, 2011; Reeves et al., 2018; Ruston & Schwanenflugel, 2010; Torgesen et al., 2001; Wasik and Hindman, 2014). However, these intervention programmes often fail to increase the outcomes for at-risk populations (Fälth et al., 2017; Hagans & Good, 2013; Spencer et al., 2012). There are a few exceptions, with studies that were able to produce long-term, code-related outcomes; see Hurry et al. (2021), Elbro and Petersen (2004) and Johanson et al. (2015). The current study suggests that providing parents with an understanding of the importance and value of literacy skills and supporting parents to implement these skills at home could be influential in fostering children's early literacy skills before school entry.

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Declarations

Conflict of interest The authors declare no competing interests.

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