

Effects of an evidence-based intervention on the Australian English language development of a vulnerable group of young Aboriginal children

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LEARNING IN BOTH INFORMAL and formal settings is vital to each child's sense of wellbeing and achievement, particularly for children identified as experiencing high levels of disadvantage and having markedly increased risk of poor educational attainment, health and development. National data indicates that Aboriginal children are especially vulnerable to low levels of engagement with education systems, including preschool. Recent reforms in early childhood education and care provision draw attention to focused educational strategies to promote early learning, since high-quality early learning experiences help to ameliorate early disadvantage.

This paper describes an experimental study designed to assess the effect of an evidence-based early learning intervention that targets both toddler language development and their capacity to attend to tasks with an adult (in this study, an early childhood educator and/or allied health professional). Aboriginal children aged 23 to 36 months participated in this intervention that was implemented by the educators at an Aboriginal long day care service over four months. The children were assessed pre-, post- and three-months following the intervention. The significant increase in their expressive and receptive language, and their initiation of joint attention behaviours, illustrates the potential of this intervention to change the language growth trajectories of very young children who live in similar circumstances. The study findings provide direction for program improvement across the centre, and set the scene for achieving practice change that may close gaps in development and achievement for children experiencing high levels of disadvantage early—long before school. Further research on the effectiveness of a larger-scale program improvement strategy is underway.

Introduction

This paper describes the effect of a small trial of an experimental, evidence-based intervention on very young Aboriginal children's Australian English language development, and the resulting impact on service provision at the study site. The study arose from vocalised concern from the collaborating organisation about how best to support very young, highly vulnerable children who are at risk of entering, or who are engaged with, the foster care system, and who take part daily in early childhood programs at the Aboriginal childcare service. The priority of the service leaders was testing of specific, evidence-based strategies that may be adopted within the service if they positively affected the Australian English language and attention of toddlers. These children often experience developmental

challenges and as a result are at risk of making poor progress. Professionals working with these children have a key role to play in promoting development, and they seek practical, culturally sensitive methods for working effectively within their everyday early childhood programs. Built on the premise that the rate of young children's learning and developmental progress can be changed using specific teaching strategies enacted through social discourse between the child and teacher (in this case staff from the Aboriginal service), the study adds to knowledge about the effectiveness of specific strategies designed to promote receptive and expressive language, and increase attention. The results are considered for their implications on the provision of better support to this group of children, and their further engagement with early childhood programs.

Background

The impact of poor early experiences and childhood trauma on attachment and development

The years prior to school are critical for child development, and children's early experiences in this formative period lay the foundations for subsequent learning (Shonkoff & Phillips, 2000). Children identified as experiencing high levels of disadvantage, neglect and trauma during these years have a markedly increased risk of discrepancies in their development of cognitive, language, social and emotional skills (Child Welfare Information Gateway, 2015; Perry, 2009, 2013; Schore, 2001; Van Ijzendoorn, Schuengel & Bakermans-Kranenburg, 1999). This places them on developmental trajectories which can be challenging to overcome, and that predict poor outcomes in academic achievement, health and wellbeing.

The Australian Early Development Census (2015) shows that 60 per cent of Aboriginal children in central Australia, the location of this study, are vulnerable on one or more domains of development by the time they start school—compared to 22 per cent of non-Aboriginal children. When reviewing the proportion of Aboriginal children vulnerable on two or more domains, the separation increases, with Aboriginal children six times as likely than their non-Aboriginal peers to be vulnerable on two or more developmental domains (43 per cent vs 7 per cent). In further investigation of the 2015 data at the jurisdictional level, Guthridge and colleagues (2016) found an increased risk of vulnerability across all measured domains for Aboriginal children when compared to their non-Aboriginal peers, with the greatest area of inequality in the language and cognitive development domain.

Yet, there are important early intervention actions that can promote a positive change in such developmental trajectories. For example, caregiver–infant interaction that is characterised by sensitive behaviour and positive affect (i.e. warm voice, positive facial expression) and less physical stimulation is a key marker of increased frontal lobe development (Bernier, Calkins & Bell, 2016); caregiver vocal stimulation and response to toddler distress assists toddler vocalisation and behavioural competence (Wachs et al., 1993); and caregiver responsiveness and sensitivity predict child cognitive functioning over time (Suor, Sturge-Apple, Davies, Cicchetti & Manning, 2015). In cases of high social deprivation, early foster care can promote toddler cognitive recovery (Nelson et al., 2007) and affect language development (Windsor et al., 2011). Long-reach impact findings for promoting toddler information processing (memory, representational competence, processing speed and attention) and language proficiency include that these measures within toddlerhood predict the child's lexical proficiency at adolescence (Rose, Feldman & Jankowsky, 2015).

Strategies that support positive developmental change in children who have experienced early adversity include caregiver behaviours that *attune* to the child and are consistent, predictable and repetitive in order to enable children to feel safe and secure (Perry, 2009); relationship-based responsive practices (Fox, Dunlop, Hemmeter, Joseph & Strain, 2003), building the shared focus of two individuals (Bruner, 1995; Mundy et al., 2007), and the overall use of trauma-sensitive approaches (Dwyer, O'Keefe, Scott & Wilson, 2012). To promote language development, strategies to increase toddlers' oral vocabulary result in greater academic and behavioural functioning when they enter school (Morgan, Farkas, Hillemeier, Hammer & Maczuga, 2015).

Language learning through interaction

The acquisition of language cannot be separated from the types of interaction a child experiences at pivotal developmental periods, including the relational dimensions noted above. While quality early experiences are the combination of a multitude of factors, it is the interactions that occur between adults and children that are the most crucial for supporting and advancing children's learning and development (Burchinal, Howes et al., 2008; Burchinal, Kainz & Cai, 2011; Curby, Grimm & Pianta, 2010). It follows that language learning, which occurs within the context of social relationships with primary caregivers, can be hindered by early experiences (Merritt & Klein, 2015) with a low frequency of joint-attention or limited adult–child interaction episodes (Hallam, Fouts, Bargreen & Perkins, 2016; Rudd, Cain & Saxon, 2008). Furthermore, toddlers' early gestures and acts of joint-attention have been found to impact their later receptive and expressive language outcomes (Watt, Wetherby & Shumway, 2006), highlighting the importance of specific early intervention programs that focus on shared attention and the promotion of language.

With its priority on language and focus on intentional, individual and responsive adult–child interactions to promote children's learning, the core ingredients of the Abecedarian Approach (Ramey, Sparling & Landesman Ramey, 2012) are well aligned with the strategies identified above as beneficial to positive developmental outcomes for children identified as high risk. The Abecedarian Approach Australia (3a) is an adapted version of the original approach, the result of a three-year project in collaboration with remote Aboriginal communities, led by the Northern Territory (NT) Department of Education (see <https://education.nt.gov.au/support-for-teachers/faft>). The adaptation involved changes to the language used in the original resources, replacement of images to represent local NT contexts and variations to the materials used to ensure implementers were able to obtain and use local items that were relevant for conducting the games. These games place a strong priority on language development and focus on learning use in a variety of situations, thereby facilitating the acquisition of skills and concepts that will later support school readiness.

Despite the large pool of literature on the effectiveness of the Abecedarian Approach at promoting positive educational and health outcomes for vulnerable children (Sparling, Ramey & Ramey, 2007), there is little published work on its use with Aboriginal children. The 3a approach is currently being implemented in playgroup settings with Aboriginal children and families in the NT (Department of Education, Families as First Teachers) and Western Australia (Gumula Aboriginal Corporation's Early Childhood 3a Project), and a study investigating the utility and effectiveness of 3a in the NT (ARC Linkage Project ID: LP130100001) is underway. Internationally, the implementation of the strategies with young Aboriginal children in Manitoba, Canada is showing promising early results in supporting language development (D'Souza, 2016). While this research focused on Australian English language development rather than first language due to the context of the study, this work contributes to the developing evidence base on the use of the 3a strategies in Australian Aboriginal contexts.

Ethics

Community consultation, focused on the identified area of need, led to a proposal for this research to be conducted at an Aboriginal community-controlled primary health care service. Local personnel engaged with the researchers over the development of the study design prior to submission to the organisation's Board of Directors and Research Sub-Committee for review and approval. This collaboration ensured that both the focus of the research was warranted and viewed as a value-add by the collaborating organisation, and that the resulting research outputs would transfer successfully into ongoing service provision. Ethical approvals were then granted by the Central Australian Human Research Ethics Committee (HREC-14-262) and the University of Melbourne Human Research Ethics Committee (Ethics ID 1442691.2). The researchers also completed a cultural competence course before engaging with the study site.

All of the child participants' caregivers and educators, and the Department of Children and Families, gave their informed consent; and steps were taken to ensure the study was conducted with respect to the Guidelines for Ethical Research in Australian Indigenous Studies (AIATSIS, 2012). Ongoing engagement with the collaborating organisation's Research Sub-Committee supported appropriate cultural engagement within the centre and a clear protocol was in place for ceasing any assessment or activity if a child was uncomfortable or lost interest.

Methods

Context

This study was conducted in central Australia within a major Aboriginal community-controlled health service's long day care centre. The facility provides early childhood

programs for children from birth to five years. The service is located on the same grounds as the main clinic and many other services and programs which have provided culturally appropriate health care since the 1970s. Many Aboriginal children in this part of Australia grow up exposed to high levels of poverty, marginalisation and social exclusion, and experience substance abuse, child neglect and low levels of formal education and school attendance (Silburn, Robinson, Arney, Johnstone & McGuinness, 2011).

Research question

Does the application of selected 3a (Abecedarian Approach Australia) strategies in a brief, intensive intervention promote gains in a group of vulnerable young Aboriginal children's receptive and expressive language? In particular, can the rate of children's expressive and receptive Australian English language development be increased such that toddlers below the normal range of Australian English language development for age catch up, reaching language levels of their same-age typically developing peers?

Study design

A single-case experimental research design was adopted in this context because the children could act as both control and experimental subjects in the A-B-A-B design (Figure 1) where A represents the program running as normal, and B represents the implementation period. This type of design is well suited to studies investigating the effect of an intervention on an individual, providing measurement of behaviour or performance repeatedly before, during and after an intervention, and is typically used with small samples (Horner & Odom, 2014; Rindskopf, 2014).

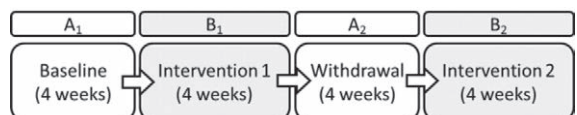


Figure 1. Study design

Participants

This trial of specific strategies to support the Australian English language development used a purposive sample of children identified as high risk by the collaborating organisation. Thirteen children were recruited to the study during the set-up period; however, two children left the centre in the early stages of the intervention and were removed from the analysed sample. Final participants in the intervention were 11 Australian Aboriginal children (five girls and six boys) aged between 23 and 36 months ($M = 31$ months, $SD = 4.8$ months) and three local early childhood professionals (two educators and one occupational therapist) living in central Australia, NT. All but one of the children who participated in this study were in the care of the Northern Territory Department of

Children and Families at the time of implementation and all children spoke Australian English as their main language in their home environment during the study period and at the long day care centre. In the period following Intervention 2, three children dropped out of the sample due to reunification with family (two) and change of childcare arrangements (one). Consequently, only eight of the original sample participated in follow-up assessments.

Measures

The Preschool Language Scales, 5th Edition (PLS-5) (Zimmerman, Steiner & Evatt Pond, 2012) was selected to measure each child's auditory comprehension (AC) and expressive communication (EC) because this tool scaled children's language development from birth, thereby enabling the detection of any marked language delay. Children's AC and EC were assessed by a psychologist who completed the assessments at each time point. Prior to the assessments, the assessor had spent time with the children participating in the study to develop relationships and ensure the children were comfortable. The AC and EC scores obtained were combined to calculate a Total Language Score for each child. The PLS-5 is conducted in Australian English, and consultation with the collaborating organisation determined that the use of this assessment was most appropriate to the study context and participants, and the language environments of the children.

The *Early Social Communication Scales (ESCS)* (Mundy et al., 2003) provided a measure of individual differences in non-verbal communication skills in three categories of early social communication: joint attention behaviours; behavioural requests; and social interaction behaviours. Children's Initiating Joint Attention (IJA) and Responding to Joint Attention (RJA) behaviours were measured. IJA behaviours observed were the child's eye contact, alternates, pointing, pointing with eye contact and showing to initiate shared attention with the assessor; RJA behaviours encompassed the child's skill in following the assessor's line of regard and proximal pointing or touching. While intended for use with children aged eight to 30 months, ESCS may be used with children whose verbal age is assessed as falling within this range. Given the locally identified developmental delay of participants, this measure was deemed appropriate for use in this study.

The Classroom Assessment Scoring System—Toddler (CLASS): La Paro, Hamre and Pianta (2012) provided an observation-based assessment of the interactions between educators and children, and the learning experiences made available through these interactions. The Toddler tool was selected for this study as it was developed for children aged 15 to 36 months. Observations were conducted against two domains that encompass a number of dimensions which assess different aspects of interaction. The 'Emotional and Behavioural Support' domain consists of five nested dimensions: Positive

Climate, Negative Climate, Teacher Sensitivity, Regard for Child Perspectives and Behaviour Guidance. The 'Engaged Support for Learning' domain has three: Facilitation of Learning and Development, Quality of Feedback and Language Modelling. The dimensions are rated on a scale of one to seven, where one and two indicate low quality; three, four and five indicate mid-range quality; and six and seven indicate high quality. The Negative Climate (NC) dimension is scored on a reverse scale, with a score of one being favourable as it indicates low levels of expressed negativity. NC is reverse-coded during analysis. Over the study period, researchers conducted four observations of the toddler-room program—one in each stage of the study. A researcher trained and certified in the use of the Toddler tool observed the program in four cycles of 20-minute blocks to provide a composite score of process quality against each dimension. Observations occurred across the day.

Time samples—Language use, engagement and interaction: Observations of children's use of language, and engagement during their time in the regular (business as usual) program were collected five times in each of the study phases. Using a purpose-built 30-second time sample form, children were observed for 10-minute durations, providing 20 points per observation. At each time point, children were coded as being verbal or non-verbal, engaged or not engaged (i.e. wandering, waiting), and involved in an interaction with another, or not involved in an interaction.

Procedures

The three participating early childhood professionals (two early childhood educators, one who is Aboriginal, and an occupational therapist) attended a training session on the intervention procedures and the teaching strategies to be implemented and were supported by the researchers throughout the study. The participant children were removed from their regular program to participate in the individual intervention sessions which occurred in a purpose-built corner of the early childhood centre, containing fixed video cameras, an activity table and chairs and basic play equipment. Effort was made to spread the implementation of the sessions equally across the three implementers.

Child assessments were conducted at three time points across the study: baseline assessments (Time 1), immediately following Intervention 2 (Time 2, $n = 11$), and three months following Intervention 2 (Time 3, $n = 8$) to investigate the fall-off of any observed change immediately after the intervention. The mean time elapsed between the first and second language assessments was 105 days ($SD = 2.8$), with 93 days between the second and third assessment ($SD = 1.85$).

In collaboration with the researchers, the participating early childhood professionals identified the key topics for the intervention session drawing on their knowledge of local culture, the children's interests and their developmental levels.

The LearningGames™ were selected from the 3a materials

as provocations to initiate interactions between the child and early childhood professional. Initially, the games selected were from the set intended for children younger than the study participants: this was to promote children's sense of confidence and achievement; however, as the study progressed, the games selected increased in difficulty.

Each daily, early intervention session comprised the use of a brief game to facilitate engagement and language usage, and an opportunity for children to take part in shared book reading with the implementer. The early childhood professional was instructed to build attunement and follow the child's lead, gradually extending the types of questioning and requests of the child once an adequate understanding of the intent of the game/play was demonstrated. Children were actively encouraged to engage in back and forth exchanges during the book reading and the activity. The implementers were instructed to demonstrate flexibility in session activity-sequence based on children's choice, and to engage with the child for 15 minutes unless the child was assessed as no longer interested. Children were free to move around the intervention space and could leave the immediate area freely. Children were transferred to and from the toddler classroom to the intervention space by a researcher or educator. The books selected for the sessions were required to have clear pictures, be matched with children's interests and provide multiple opportunities for sustained conversation.

Children were scheduled to participate in the daily intervention sessions with the three early childhood professionals across two, four-week blocks. Of the 418 anticipated sessions (38 per child), 345 were conducted (83 per cent).

Staff absenteeism, child illness and child access visits with family resulted in 73 sessions being missed. Each child participated in an average of 14.73 sessions in Intervention 1 (range 11–17) and 16.64 in Intervention 2 (range 15–18). The mean session time was 13:39 minutes ($SD = 3:57$ minutes) during Intervention 1 and 14:02 minutes ($SD = 4:04$ minutes) in Intervention 2. The average time spent participating in the intervention per child was seven hours and 14 minutes, across the two intervention periods. Implementer 1 conducted 99 sessions, implementer 2 conducted 128 sessions and implementer 3 conducted 118 sessions with the children.

All intervention sessions were audio- and video-taped in a purpose-built area within the centre. One tripod camera (1), three mounted cameras (2), and two portable microphones (3) were set up as depicted in Figure 2. The cameras were turned on and off for each session by a researcher or the implementer.

Analysis

Time sample observations of the participating children were analysed to identify change in the patterns of behaviour over the duration of the study. The frequencies of the observed behaviours were identified to describe

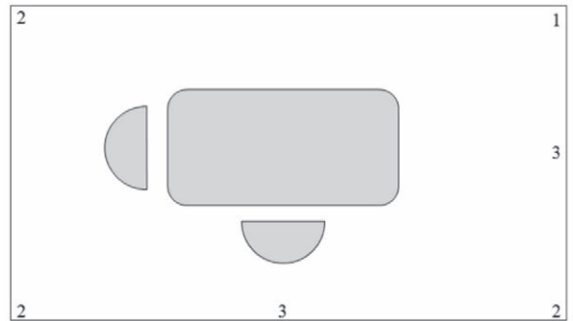


Figure 2. Early Intervention area set-up

the sample and obtain the proportion of time that each type of behaviour was being exhibited across the group.

Due to the small sample size, descriptive statistics were run on the child assessment (PLS-5 and ESCS), program and video data using the analytic procedures specified in the manuals for use of these tools. Paired sample t-tests were then conducted to explore changes in performance pre- and post-intervention, and follow-up.

Results

Australian English language development

Age Equivalence: Age equivalence scores from the baseline (Time 1) assessments confirmed mean delays in Auditory Comprehension ($M = -6.8$, $SD = 3.0$) and Expressive Communication ($M = -7.5$, $SD = 2.3$) across the sample, verifying that the children targeted for this intervention presented with Australian English language ability considerably lower than the norms for their chronological age. Figure 3 presents the mean age equivalent scores in Auditory Comprehension and Expressive Communication compared to children's actual age at each assessment point. A strong improvement in Australian English language ability was found following the intervention, with a 7.2 month and 6.9 month average increase in age-equivalent scores in Auditory Comprehension and Expressive Communication scores respectively over a four-month period. Comparison of the change in these scores was found to be significant: Auditory Comprehension, $t(10) = -6.37$, $p = 0.00$, 95% CI [-9.69, -4.67]; Expressive Communication, $t(10) = -7.36$, $p = 0.00$, 95% CI [-9, -4.82].

Following the end of the intervention phase, children's language development did not maintain the high rate of upward growth apparent between the first two assessments. A mean increase of 1.5 months in age equivalence for Auditory Comprehension, and a 2.6 month increase in age equivalence scores for Expressive Communication, was observed over the three-month period to the follow-up assessment. This growth

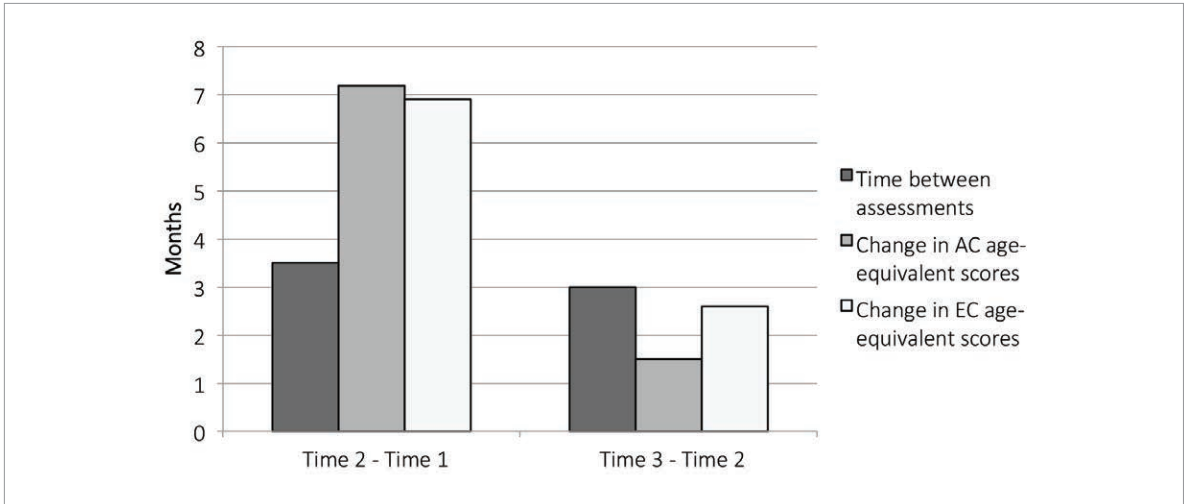


Figure 3. Change in mean AC and EC age-equivalent scores over the period of time between assessments

plateau indicates that children’s Australian English language development was facilitated through the participation in the intervention, and upon cessation, progression that was closer to average development occurred.

Auditory Comprehension and Expressive Communication: Table 1 presents the mean and standard scores for the Auditory Comprehension and Expressive Communication for children at each assessment point. Paired sample t-tests of language assessments were conducted and, as anticipated, show strongly significant change in children’s language development in both areas following the intervention: Auditory Comprehension, $t(10) = -4.19, p = 0.002, 95\% \text{ CI } [-17.69, -5.40]$; and Expressive Communication, $t(10) = -3.39, p = 0.007, 95\% \text{ CI } [-14.01, -2.90]$.

Initiating and responding to joint attention behaviours

As illustrated in Figure 4, the IJA scores from Time 1 and Time 2 assessments indicate that a significant difference was observed in the children’s IJA behaviours: $t(10) = -3.67, p = 0.004, 95\% \text{ CI } [-24.54, -6]$. This pattern did not hold for children’s RJA behaviours: $t(10) = -0.89, p = 0.40, 95\% \text{ CI } [-1.28, 0.55]$.

Child language use, engagement and interaction during the toddler room (business as usual) program

Time sample observations of participating children were analysed to identify any changes in patterns of language use, engagement in the program and interaction with others over the duration of the study.

Language use: Observations of children’s language use demonstrated a clear increase in the frequency of language use. Figure 5 presents the proportion of time children were observed as verbal and non-verbal during the observations. As the study progressed, children used language more frequently in their interactions, with an increase of 18 per cent in Intervention 2. This finding is supported by the increase in children’s expressive and receptive language over the study period.

Engagement: As depicted in Figure 6, the observed frequency of time spent by children actively engaged in the program increased by 31 per cent over the period of the study. In contrast to the pattern of children’s language use noted above, a slight decline in engagement was observed during the intervention withdrawal period of the study, before a distinct rise during the second intervention period.

Table 1. PLS-5 Standard Scores

	Baseline (Time 1)		Post Intervention 2 (Time 2)		3-month follow-up (Time 3)	
	M	SD	M	SD	M	SD
Auditory Comprehension	82.0	6.7	93.5	3.7	89.0	5.2
Expressive Communication	85.4	10.1	93.8	7.8	91.4	8.9

Note: Time 1, $n = 11$; Time 2, $n = 11$; Time 3, $n = 8$.

Interactions with others: Children demonstrated a sharp increase in the time they spent interacting with others upon commencement of participation in the first intervention period. Minimal change was observed across the Withdrawal and Intervention 2 stages with little variation seen once children were observed interacting 80 per cent of their time in the program (Figure 7).

Interaction quality

Analysis of CLASS data demonstrated positive change in the Emotional and Behavioural Support domain between Baseline and Intervention 2 assessments (Figure 8).

Mean scores for Positive Climate, Regard for Child Perspectives and Behaviour Guidance all steadily moved

from the low (1–2) to mid-range (3–5) while a reduction in Teacher Sensitivity was observed during the Withdrawal period. Perhaps most notable was the reduction of behaviours associated with Negative Climate, indicating a decline in toddler room interactions between educators and children that were characterised by disrespectful behaviour, peer aggression, harshness or insensitivity.

The mean scores for each of the Engaged Support for Learning dimensions are presented in Figure 9. While remaining in the low range, with the exception of the presence of Language Modelling behaviours in the Intervention 2 period ($M = 3, SD = 0.82$), visible differences in each of the dimensions are apparent.

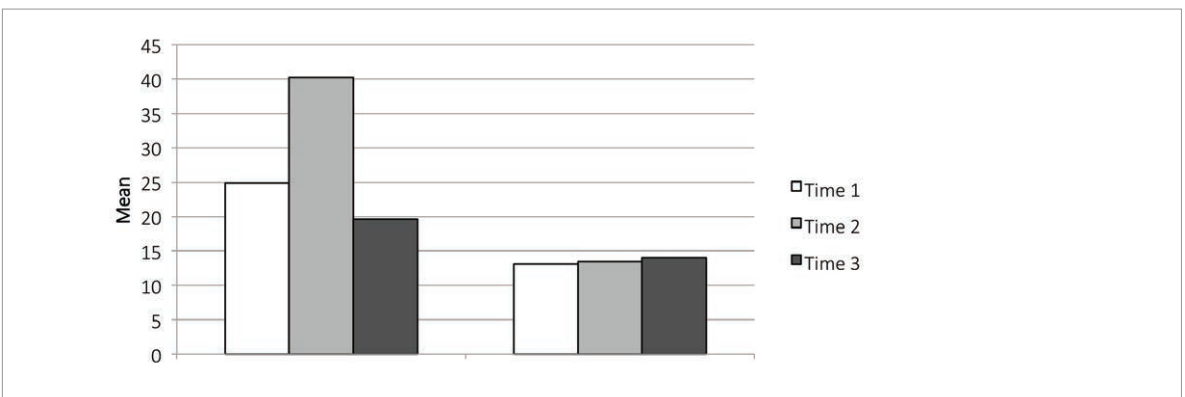


Figure 4. Mean scores for Initiating Joint Attention (IJA) and Responding to Joint Attention (RJA) behaviours

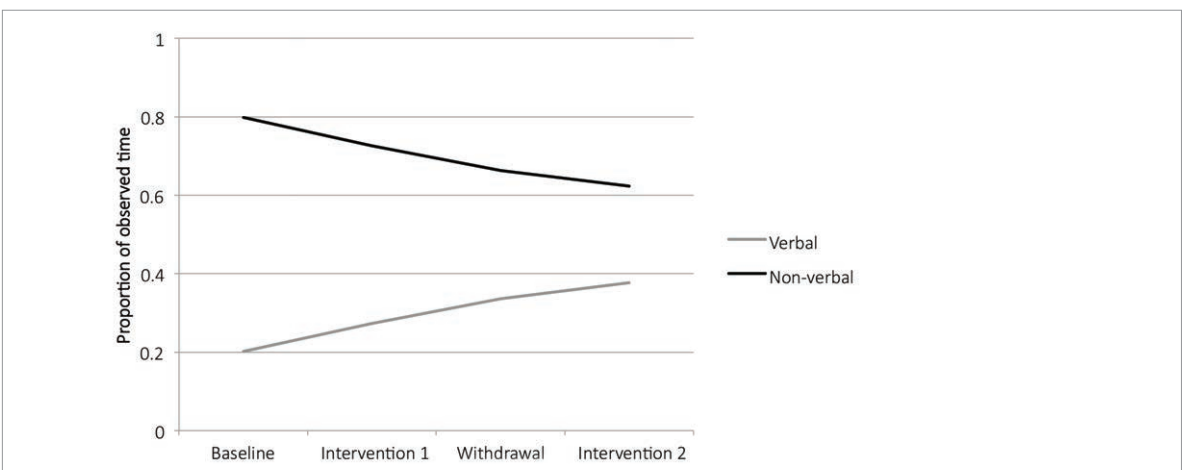


Figure 5. Frequency of language use across study periods

Given the focus of the intervention was supporting children's language development, the observed increase in the Language Modelling dimension is of particular interest and may be a reflection of the educators' verbal engagements in response to children's increased use of language over the study period.

A clear improvement in the process quality observed in the toddler room at the centre was apparent over the period of the study, particularly in the Emotional and Behavioural Support domain. This shift resulted in more positive, responsive interactions between children and staff which may help to explain the increase in the observed interactions, engagement and language use by the children themselves.

Discussion

This study set out to test, in the context of a remote Aboriginal community-controlled health service's long day care centre, whether a significant effect on children's Australian English language development could be demonstrated in a time-limited period through the addition of selected 3a (Abecedarian Approach Australia) strategies into each child's daily experience. For the children in this intervention program their participation in these strategies resulted in clear gains in receptive and expressive language usage. Notably, within this four-month intervention period, a 7.2 months and 6.9 months average increase in the children's age-equivalent scores in Auditory Comprehension and Expressive Communication was

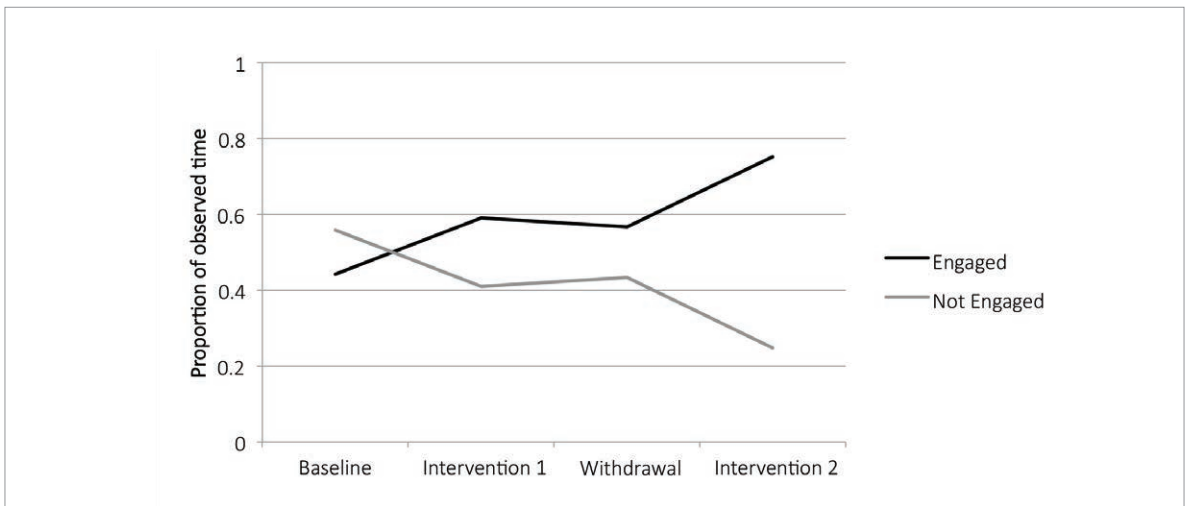


Figure 6. Proportion of time spent engaged in the program across study stages

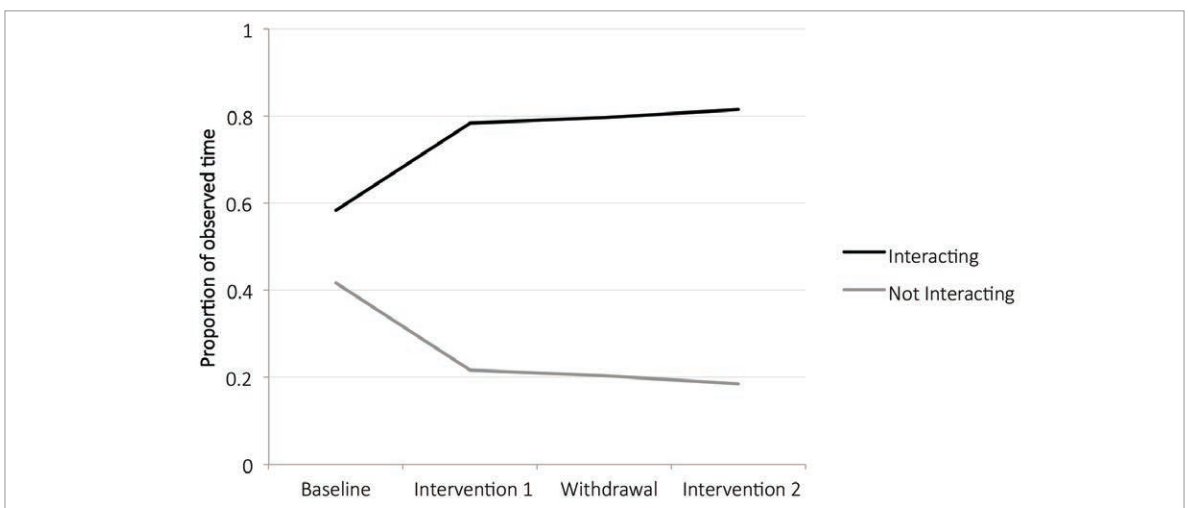


Figure 7. Proportion of time interacting with others across study stages

demonstrated to be significant, almost double the normally expected rate of progress. This may partly be due to the very low-level entry scores of the children, allowing for significant growth once individual attention is given to these children, and the creation of a new area for focused activity that limited the number of distractions that typically exist in a large playroom. Three months following the end of the brief daily individual sessions, the rate of child language

growth had dropped back, showing a growth of 1.5 months in age equivalence scores for Auditory Comprehension and a 2.6-month increase in age equivalence scores for Expressive Communication over the three-month period. The brief individual intervention sessions made a significant difference to the *rate* of children's progress. Although generalisations cannot be drawn from this small-scale trial, a large longitudinal study of young children in Australian early

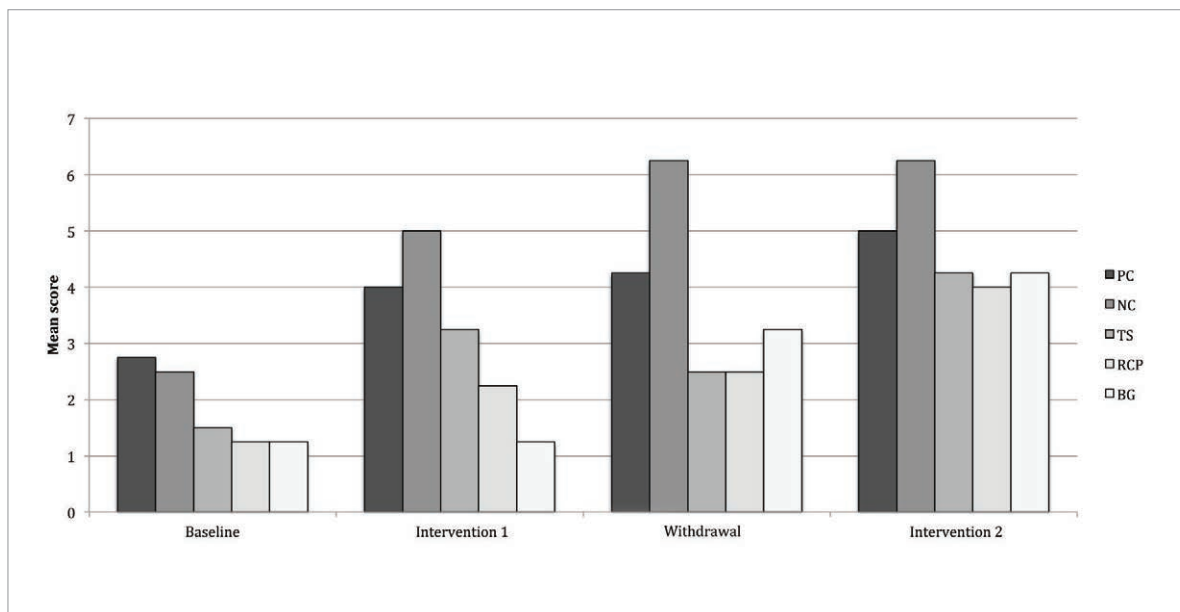


Figure 8. Mean scores from the Emotional and Behavioural Support domain across study periods.
 Note: PC = Positive Climate; NC = Negative Climate; TS = Teacher Sensitivity; RCP = Regard for Child's Perspective; BG = Behaviour Guidance. (NC scores have been reversed.)

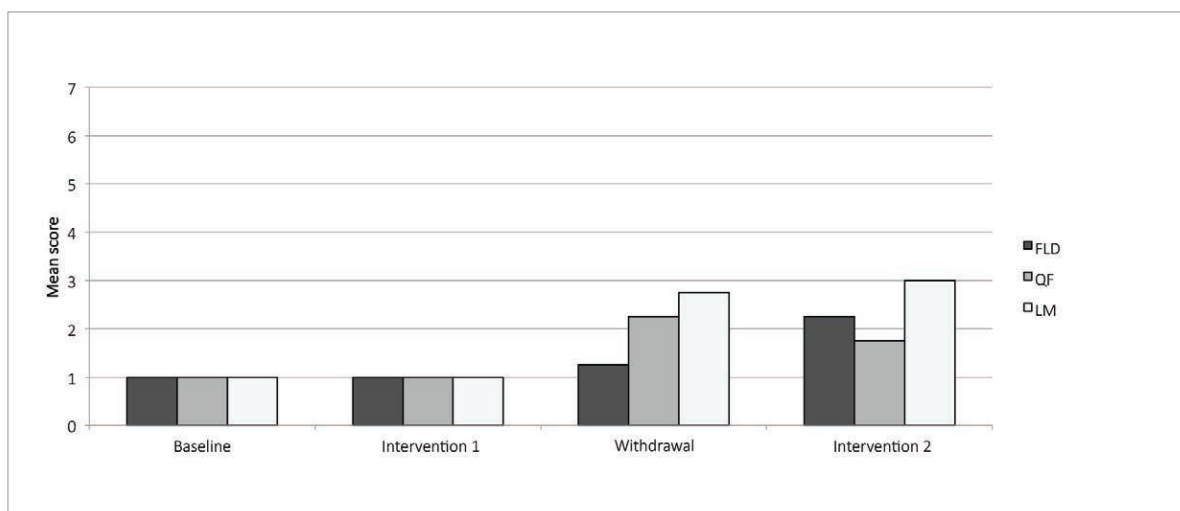


Figure 9. Mean scores for the Engaged Support for Learning domain across study periods
 Note: FLD = Facilitation of Learning and Development; QF = Quality of Feedback; LM = Language Modelling

childhood education and care settings established that, for the children who enter programs with very low levels of performance, their rate of progress over time declines in an absolute sense and relative to their peers, in the *absence* of specific early intervention (Tayler, Cloney & Niklas, 2015).

Because interactional competencies that develop in the first two years of life set the scene for all further social communication (Seibert, Hogan & Mundy, 1982), interest in the capacity of the participants to initiate joint attention episodes and respond to efforts at joint attention made by the professional were considered. The strategies used in the intervention sessions were to be sensitive to the child's attention. Although a significant increase in the children's initiation of joint attention was evident across the first intervention period, this was not sustained over the remaining study phases. There was no significant change in the children's responses to joint attention bids during the study, and all children reduced their joint attention behaviours. Other factors may have contributed to this finding. During Intervention 2, the children were using other means of communication more frequently, and due to the reinstatement of the preschool-room program in the adjoining area, the corner in which the individual sessions were conducted was unable to be set up in exactly the same way. This may have resulted in greater exposure to noise from a 'close-by' program as the children engaged in their individual sessions. There are also limitations in the measurement process itself. Further instrument refinement and inquiry is needed to establish the effect of changes in joint attention on language growth over time. More precise measurement of toddler information processing, including measures of memory, representational competence and processing speed, in addition to attention, may be necessary to understand the mechanisms driving children's developing communication capacity and trajectory (Rose et al., 2015).

The study children also participated in the 'business-as-usual' toddler room program at times surrounding the brief individual early interventions (EI), and during the EI withdrawal months. An encouraging result was the clear increase in the participating children's verbal communication during the normal program, and significant growth in their engagement within the normal program over the course of the study. This, corresponding with marked growth in interacting with others, indicated that the children's daily experience in the setting changed over the study-time from one of greater isolation or exclusion to engagement. In addition, overall ratings of the emotional and behavioural support occurring in the toddler room increased over the study period, and some positive growth occurred in adult behaviours that indicate facilitation of the children's learning. These findings, although limited, demonstrate positive growth in aspects of the interactive environment that are clearly important from other studies of improvements in child cognitive and language development (Burchinal, Howes et al., 2008; Burchinal, Kainz et al., 2011; Curby et al., 2010).

Impact on the study site

One of the strongest motivators for sustained change in teaching practices is evidence that practice efforts are related to improvements in children's learning (Klinger, 2004; Wagner & French, 2010). The implementation of this study at the site refocused staff attention on the quality of the program being delivered. Over the course of the study there was increasing communication at all levels of the organisation about the supports required to meet the complex learning and development needs of the children who attend this service. The overall result was the development of an improvement strategy, driven by the organisation, which focused on the educational program, staff development, and the integration of specific local health and education programs to provide the children with improved learning and development support. Implementation of this improvement strategy continues with the intent to culminate in the transition to an approved early childhood service.

Strengths and limitations

This small-scale trial of strategies designed to promote receptive and expressive language, and increase attention was able to demonstrate the power of focused interactive teaching and learning when regular one-to-one sessions can be achieved with children who stand to benefit greatly from sensitive, culturally responsive and effective approaches to learning. However, there are also limitations the authors wish to highlight.

Although the children studied were using Australian English as their main language (both at their home environments during the study and at the long day care centre), it is acknowledged that these children come from diverse language backgrounds and experience English as an additional language, being variously exposed to the Indigenous languages used in their communities. In the absence of culturally appropriate standardised assessment tools, and because of dominant Australian English usage in this context, the children were assessed in Australian English, and the intervention was conducted in Australian English. Hence, results represent the toddlers' development in Australian English language over the study period. As such, caution should be taken when considering the reported levels of language delay, as these pertain only to Australian English language. Had it been possible, both the intervention and the assessment of children would have been conducted by speakers of the children's first languages; however, the absence of appropriately qualified and available implementers prohibited this at the time the study was conducted. Despite this, we feel there was merit working with the community to trial this approach to supporting the learning and development of a vulnerable group of children and establish evidence for further investigation into the area of Aboriginal children's Australian English language development and the strategies that can be used to promote this.

Challenges were also experienced by the researchers due to the complex environment where the study occurred, with consistent poor staff attendance necessitating flexibility in the researchers' engagement in the space, impacting on the implementation of the intervention and on the delivery of the educational program at the centre during the study period.

Future directions

Both the findings reported in this paper and limitations discussed above highlight the need to continue investigation into strategies to support vulnerable children's language learning. While not the focus of this paper, recent research studies have focused on the complexity of Aboriginal children's language environments (McLeod, Verdon & Bennetts Kneebone, 2014), the development of Australian Aboriginal children's language (Farrant, Shepherd, Walker & Pearson, 2014; Vaughan, Wigglesworth, Loakes, Disbray & Moses, 2015), and the need to use assessments of language that are appropriate to English as additional language learners for an accurate representation of children's language abilities (Gould, 2008; Miller, Webster, Knight & Comino, 2014; Pearce & Williams, 2013). These studies highlight the paucity of research on Aboriginal children's language acquisition and the high incidences of diagnosed language delay prevalent within Aboriginal populations. Developing a deeper understanding of language learning across diverse linguistic and cultural settings is essential if we are to support educational engagement and positive learning and development outcomes for all Australian children.

Conclusion

This experimental study demonstrated the potential of deploying Abecedarian strategies that were customised to suit the local setting. There is considerable promise in the conduct of one-to-one adult-child learning sessions that promote participation, engagement and language, and its application as an approach to promote positive developmental outcomes for children identified as vulnerable. Further study is in progress of the active ingredients of this intervention, and the impact of a broader program improvement strategy that is focused on increasing the quality of provision of care and education at the service.

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