SOUND & SYMBOL

creative futures

Sound & Symbol – Full Report

Introduction

Addressing speech, language and communication needs for children prior to starting school is a pressing concern for many societies including in the UK. Approximately 25% of young children have a Speech, Language and Communication Need (SLCN), and most of these persist into adulthood. There is evidence that those from lower socio-economic backgrounds are more at risk from the consequences of not developing their language sufficiently to thrive in school. This project intends to contribute to tackling the persistent attainment gap between most and least disadvantaged children – a gap now widened due to the coronavirus lockdown measures in 2020-21.

Project aim

The quantitative area of the research aimed to assess whether the intervention enhanced communication, language, emergent literacy and executive function skills of children prior to starting school. This was done by comparing the language progress of children taking part in the Sound & Symbol intervention, with a comparable group of children who attended nurseries in the same area. The intervention focused on developing nursery practitioner skills in delivering circle time sessions using singing and books and embedding musical free play in the nursery, day-to-day.

Design and methods

For this project we collected sources of both qualitative and quantitative data. Quantitative data was collected by an external research team led by Professor Graham Welch and Professor Dominic Wyse from the UCL Institute of Education. Using a control intervention design, the researchers completed a range of assessments with the children both pre- and post-intervention that covered aspects of executive function, communication and language skills, and emergent literacy. Qualitative data comprised weekly journals completed by the music practitioner (MP) and early years practitioner (EYP), observations by the Creative Futures Creative Producer and additional observations by the research team.

The project was delivered to the two intervention nurseries between October 2021 and March 2022, with measurements taken in all four participating nurseries pre and post intervention (September 2021 and April 2022). Each intervention nursery was visited by an early years music specialist from Creative Futures once a week for a full day for 20 weeks. The full day model allowed the musician to interact with children whether they attended in the morning or the afternoon, and facilitated time for the musician and teacher to interact and co-deliver. The intervention consisted of a mix of free-play, and adult-led activities which focussed strongly on a set book chosen by each setting for each 10-week phase.

Group activities included singing songs, reading passages from the set text, exploring the rhythm and language of passages from the text and creating soundscapes, improvisations and compositions to illustrate the text.

Participants

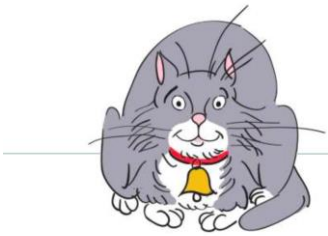
74 children were initially tested across all four nurseries in September 2021. During follow-up testing in April 2022, 8 children had left their nursery and 6 were absent or refused to take part during data collection. Therefore, results were analysed for 60 children who took part across the four nursery settings (30 intervention group children, and 30 control group children).

Assessment tools

A selection of assessment tools were carefully chosen in order to cover different aspects of children's language and communication development and emergent literacy skills. They consisted of the following tools:

"GAPS" - Grammar and Phonology Screening

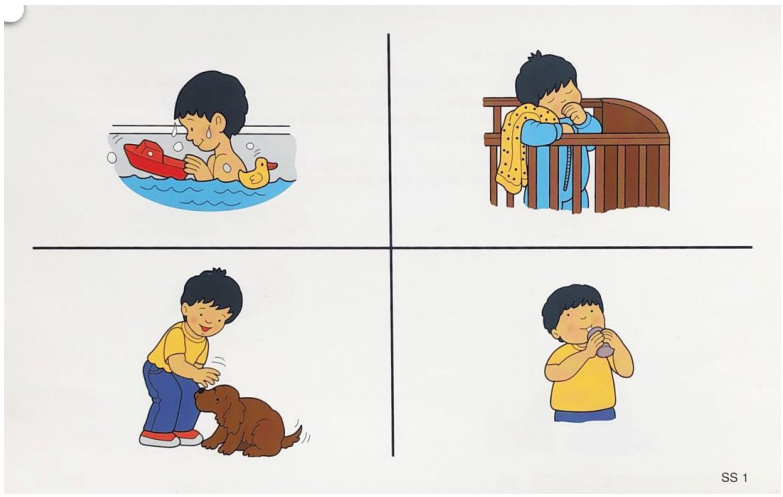
This is a very quick and simple repetition task, designed to assess basic grammatical ability across sentences and word forms. Children are asked to repeat sentences spoken by the adult e.g. "This is the cat", "The cat is grey", to a teddy or toy. There is a picture book to accompany the sentences, and there are 14 sentences in all.



The second part of the test is the repetition of 8 nonsense words e.g. "*tobilf*" "*klest*" which gives a measure of children phonological skills.

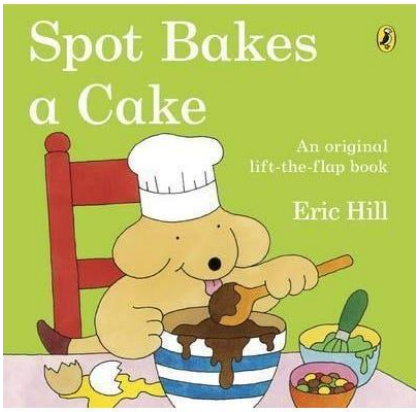
Preschool CELF - Sentence structure (Receptive Language)

This is used as a measure of children's receptive language skills.
In this task, children are shown a series of pictures and asked to point to the one that corresponds to what the adult is saying. For example, the child is shown the array of 4 pictures below and asked "can you point to *"the boy is sleepy"*?"



Print and word awareness (Justice & Ezell, 2001)

This assessment is used as a measure of children's emergent literacy skills, focusing on children's concept and knowledge of print. It comprises two sections; Words in Print and Print Concepts. An adult reads a picture book to the child - "Spot Bakes a Cake" by Eric Hill.



As they read the book, the adult asks the child a series of questions relating to the text. In the Print Concepts section, children are asked questions relating to their knowledge of how books work, directionality of text and the relationship between the words on the page and with the story that is being read to them e.g. "Can you show me the front of the book?", "where do I begin to read?".

The Words in Print section focuses on questions relating to children's understanding of the form and function of print, for example, "Can you show me just one word on this page", "I can see some big words and some little words on this page. Can you show me where the little ones are?", "Can you show me the longest word on this page?".

Peg tapping task (Diamond & Taylor, 1996)

This is an executive function task which is commonly used with young children to measure motor inhibition skill. The child is given a wooden dowel or stick, and the adult has one too. The adult tells the child "when I tap one time, you tap two times… let's try that" and they practice the rule. Once the child can do that, the adult says "now, when I tap two times, you tap one time".

The task requires both the ability to hold two things in mind, 1) rule to tap once when the adult taps twice and 2) rule to tap twice when adult taps once, and the ability to exercise inhibitory control over one's prepotent behaviour - the natural tendency to mimic what the adult does.

When I tap 2 times,
you tap 1 time
When I tap 1 time,
you tap 2 times

Analysis and interpretation of data by Outcome

Throughout the project children had the opportunity to engage with a broad range of musical and story book-based experiences including adult-led group work and play with provocations.

Outcome: Musical Development is enhanced

Practitioner journals show children creating new lyrics for songs in group time, composing their own songs, developing understanding of concepts such as tempo and dynamics, using these to make creative choices and direct group playing, developing skills in starting and stopping together, and anticipating key moments in the music.

Observations by the external research team show similar findings, particularly in the areas of tempo, pulse and group coordination:

> *"Musical skill development was clearly visible during two further observation time points later along the intervention programme timeline….At the late stages of the intervention, there were multiple examples of children drumming in time to the pulse of sung songs, as well as in groups. Children were also heard changing their drumming speed to enable them to fit in with others."*
>
> (Alice Bowmer, Researcher)

Children's self-identity as musicians also seems to have been reinforced through the project. As they realised their music was valued, children shared what they liked to listen to at home such as child R who shared a song from Fortnite, which then facilitated a conversation about an older sibling at home. At setting E, children were given responsibility for collecting all soundmakers in the setting, setting out all the equipment in new areas and redesigning their musical environment. We hope this will provide a positive foundation for children to explore and develop in their musical lives.

Communication development is improved

Children's communication skills have also developed throughout the project. One EYP commented:

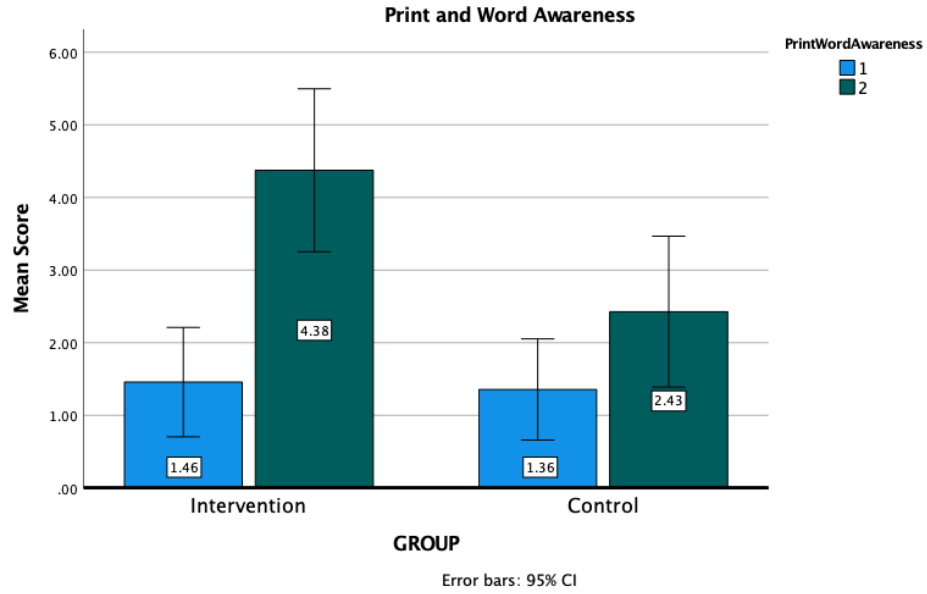
> *"We have seen such huge changes in the children's language and development and that is all thanks to the music sessions you have taught us. We have received such positive feedback from parents also".*
>
> (EYP, Setting F)

Qualitative sources suggest that the impact of the project has been particularly significant for non-verbal children. Journals kept by the MP and EYP across the four settings include numerous examples of non-verbal children having the opportunity to be highly communicative, express themselves and make connections: using gesture to direct the playing of a group, taking part in instrument conversations, and using movement to create duets with a partner.

Child A, who had previously been selectively mute in the setting, even spoke his first words saying “let’s do it again!” in reference to a music activity. In future weeks he used his own name and that of the MP to organize turn-taking in a musical interaction. In another nursery, a previously non-verbal child joined in singing a song in group time, his first verbal expression in the setting.

Across the whole sample, results for the children in the study were well below the national average on the two standardised language assessments completed by the research team, when initially tested in September 2021. Children in each of the four nurseries improved on all measures by the end of the study; some increase would be expected over time of course but intervention groups showed a greater improvement than the control groups on all tasks, which suggests the project has contributed to accelerated progress.

The graph below shows results for the print and word awareness task, where increase in development was particularly significant:



At follow-up testing (post-intervention) the intervention group scores significantly improved, bringing their achievement levels close to UK average on the standardised language assessments.

Outcome: Early Years Practitioners develop new skills and confidence in music

EYPs involved in the project have developed their skills and confidence in music-making with children. Journals show that while the MP led group times at the start of the project, over the weeks EYPs started to co-lead and then take over group times. One EYP made a resource pack including everything she had learnt to share with colleagues so that they could try the same activities. Importantly, the resource pack reflects not only activities and songs to try but also pedagogical approaches such as to allow space for children to input their ideas into the song.

Analysis and interpretation of data by Test

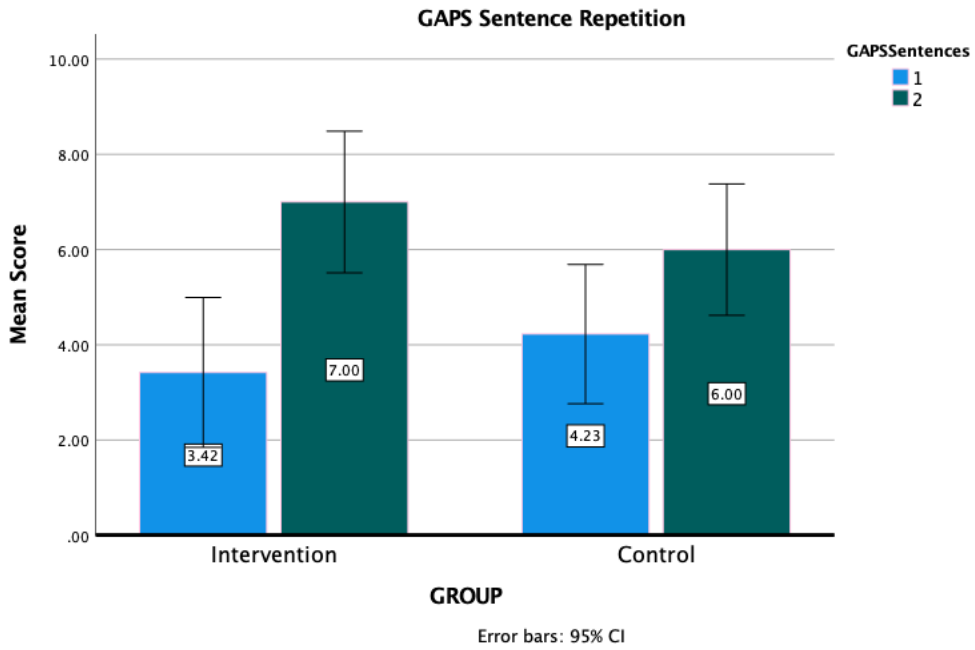
1. GAPS - Sentence repetition

The first task looked at children's ability to accurately repeat sentences, and was a measure of their grammatical ability. Table 1 and Graph 1 show the intervention and control group's scores on this task at time 1 and time 2 testing. The task was scored out of a **maximum of 11.**

Table 1. Mean scores of each group on the GAPS Sentence test

	GAPS Sentence Mean Score Time 1	**GAPS Sentence Mean Score Time 2**
Intervention Group	**3.42**	**7.00**
Control Group	**4.23**	**6.00**

Graph 1. Group performance on GAPS Sentence Repetition at timepoints 1 and 2



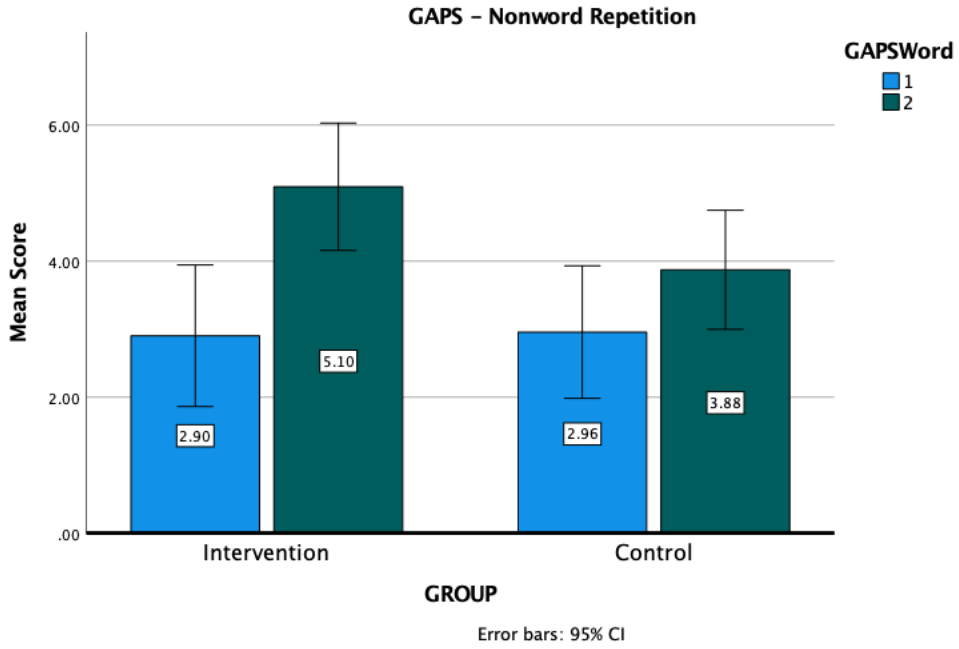
Children in both groups have made improvements over time on this task, as would be expected. However, a repeated measures ANOVA showed there was a significant difference in the amount of change seen between the groups, with the intervention group showing greater improvement by time 2. (GAPS Sentence*Group F(1)=4.288, p=.045 effect size = .099)

The second part of this task required the children to repeat back nonsense words. This is commonly used as a measure of children's phonological skills. Table 2 and Graph 2 show the intervention and control group's scores on this task at time 1 and time 2 testing. This task is scored out of a **maximum of 8**.

Table 2. Mean scores on the GAPS Non-Word Repetition

	GAPS Non-Word Repetition Mean Score Time 1	GAPS Non-word Repetition Mean Score Time 2
Intervention Group	**2.90**	**5.01**
Control Group	**2.96**	**3.88**

Graph 2. Group performance on GAPS Sentence Repetition at timepoints 1 and 2



As with the sentence repetition section, children in both groups have made improvements over time on this task. However, a repeated measures ANOVA showed there was a significant difference in the amount of change seen between the groups, with the intervention group showing greater improvement by time 2. (GAPS Word*Group F(1)=4.852, p=.033 effect size = .101)

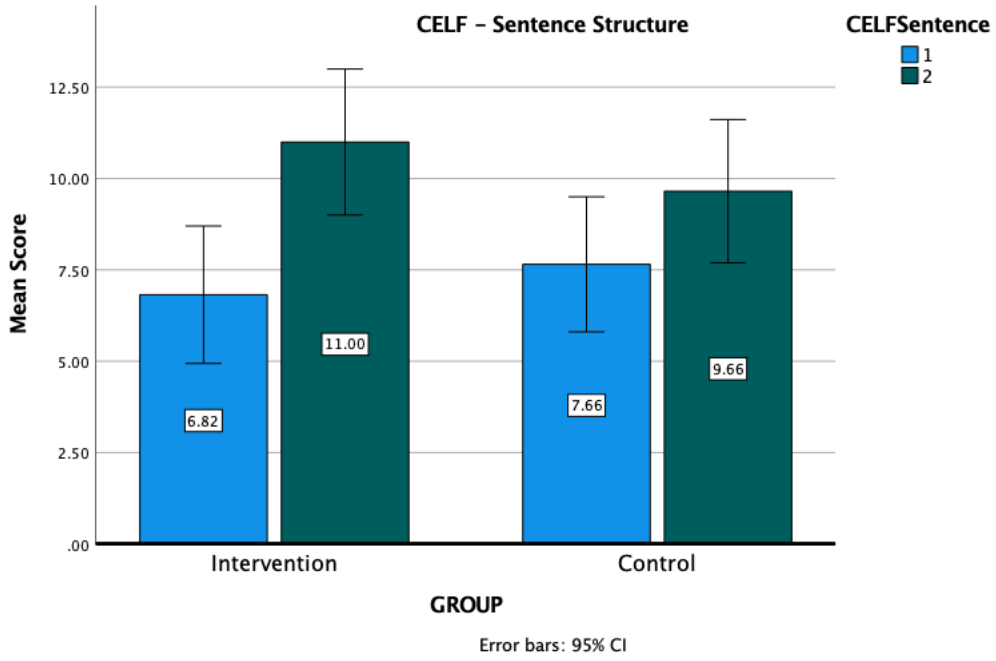
2. CELF - Sentence Structure

CELF sentence structure is a measure of children's receptive language skills (their understanding of spoken language, rather than production). Table 3 and Graph 3 show the intervention and control group's scores on this task at time 1 and time 2 testing. This task is scored out of a **maximum of 22.** (The expected average score for this age group is between 11-15).

Table 3. Mean scores on the CELF-Sentence Structure (Receptive language)

	CELF - Sentence Structure Mean Score Time 1	CELF Sentence Structure Mean Score Time 2
Intervention Group	**6.82**	**11.00**
Control Group	**7.66**	**9.66**

Graph 3. Group performance on CELF - Sentence Structure at timepoints 1 and 2



Both groups of children made improvements over time on this task. However, a repeated measures ANOVA showed there was a significant difference in the amount of change seen between the groups, with the intervention group showing greater improvement by time 2. (CELF Sentence*Group F(1)=4.458, p=.039 Effect size = .079). By time 2, the intervention group average was approaching what would be expected for children aged 3 years to 3 years 5 months.

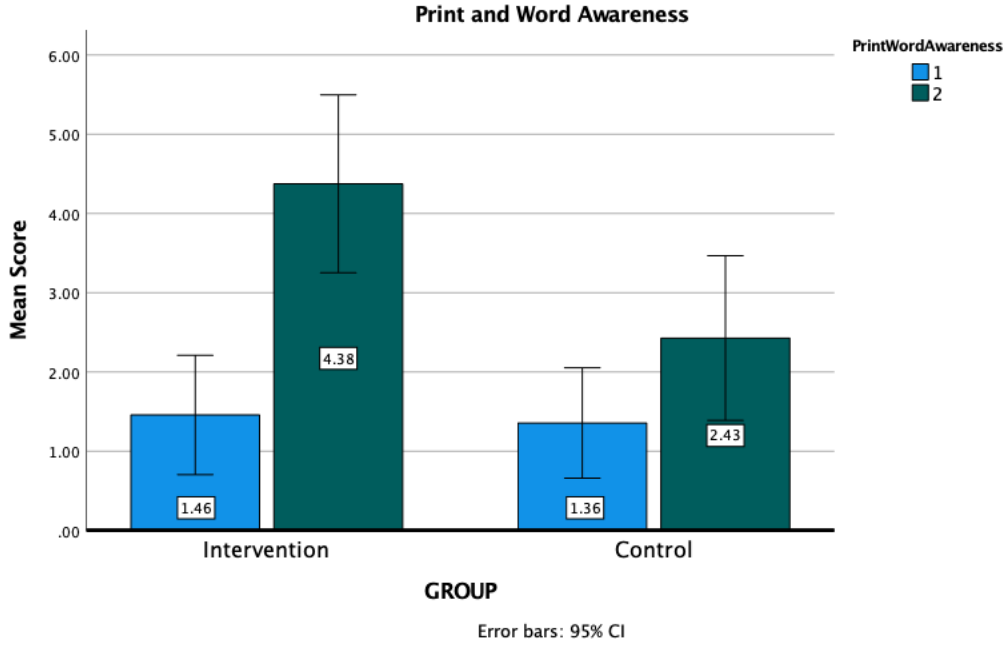
4. Print and Word Awareness

This task was a measure of children's emergent literacy skills, and their awareness of how books work in terms of the function of words and print. Table 4 and Graph 4 show the intervention and control group's scores on this task at time 1 and time 2 testing. The task is not standardised, and was scored out of a **maximum of 30.**

Table 4. Mean scores on the Print and Word Awareness Task

	Print and Word Awareness Mean Score Time 1	**Print and Word Awareness Mean Score Time 2**
Intervention Group	**1.46**	**4.38**
Control Group	**1.36**	**2.43**

Graph 4. Group performance on Print and Word Awareness at timepoints 1 and 2



Again, both groups of children from all 4 nurseries made improvements over time on this task, showing development in their understanding and familiarity with books. However, a repeated measures ANOVA showed there was a significant difference in the amount of change seen between the groups, with the intervention group showing greater improvement by time 2. (PrintWordAwareness*Group F(1)=4.914, p=.031 Effect size = .089).

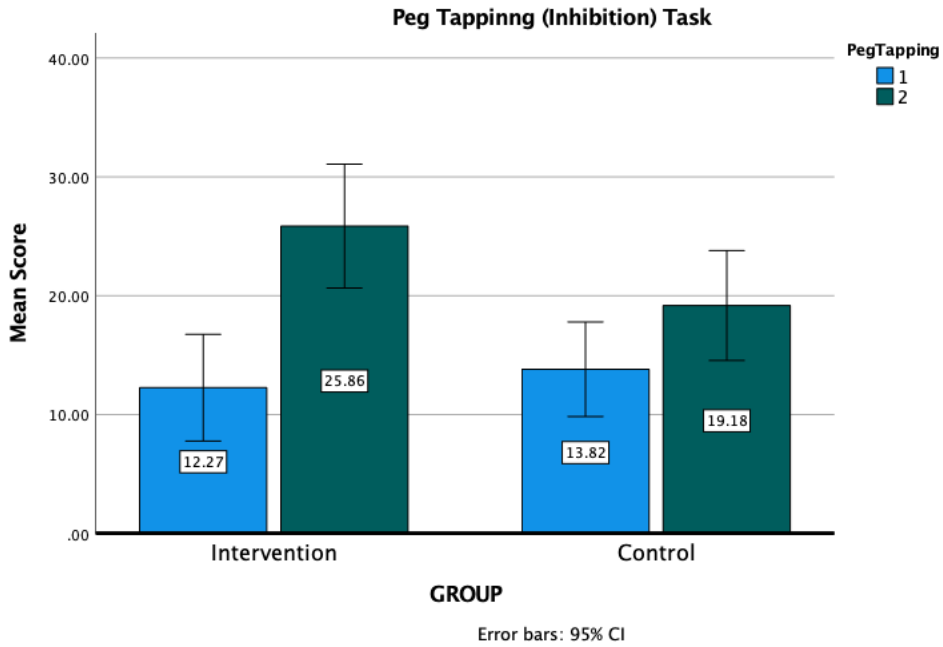
5. Peg Tapping (Inhibition)

The final task was an inhibition task, used as measure of children's executive function. This task required children to inhibit an automatic motor response, and to remember and apply an opposite tapping rule. Table 5 and Graph 5 show the intervention and control group's scores on this task at time 1 and time 2 testing. The task is not standardised, and was scored out of a **maximum of 40.**

Table 5. Mean scores on the Peg Tapping Task

	Peg Tapping (Inhibition) Mean Score Time 1	**Peg Tapping (Inhibition) Mean Score Time 2**
Intervention Group	**12.27**	**25.86**
Control Group	**13.82**	**19.18**

Graph 5. Group performance on Peg Tapping at timepoints 1 and 2



We found the same pattern of results with this task as we did with the language and emergent literacy tasks. Improvement in inhibition skill could be seen across all groups between the two time points, however, the intervention group showed a significantly greater change over time than the control group. (PegTapping*Group F(1)=6.519, p=.014 Effect size = .120).

Discussion of findings

While it may seem self-evident, this project has reinforced the value of a musically experienced and confident adult in supporting children's music-making. A practitioner journal describes how Child K was singing a song over and over again and so the MP started accompanying them on the ukulele. Child K asked for it to be repeated so many times that the MP began to change the key each time and noted that each time Child K was able to adjust her singing to the new key, even without the MP singing along. It is possible that Child K is already very musically experienced and may sing a lot at home or in other settings in their community and it is difficult to establish causality in respect of development in this example; it does however demonstrate the musical skills that can be useful to an adult in not only recognising a child's competence but also in scaffolding an activity to provide, in the moment, an appropriate further level of challenge.

Using music to encourage engagement with books also seems to have been effective. At the start of the project, books weren't offered in setting A as staff felt that children couldn't be trusted to look after them properly. The MP's musical work with books has made them much more popular with children and towards the end of the project the MP reported that if she sat anywhere near the bookshelf, "*children would carefully bring me book after book and helped me to finish sentences, make up songs around the story and ask me detailed questions about the contents*". Again, it is difficult to establish causality here as perhaps any adult interacting enthusiastically with books, musically or otherwise, might have had the

same effect. However, from journals and observations, we wonder whether there are some aspects of music that may help:

1. Music can provide a structure for repetition, which may breed familiarity and then confidence.
2. That repetition and regularity can provide a base from which change can then be introduced to bring anticipation, surprise, humour, challenge etc.
3. Our musical approach was very multimodal/intermodal and included activities that combined music and movement, mark-making, play-doh, small world etc. This allowed us to link the books to children's interests, competencies, schemas.

Across the whole sample, the 3-4-year-old children in this study were well below the national average on two standardised language assessments, when initially tested in September 2021. However, children in each of the four nurseries improved on all measures by the end of the study. Importantly, significant differences in improvement were seen between the groups, where the intervention groups showed a greater improvement than the control groups on all tasks.

There were multiple strengths demonstrated in this study, notably the children engaged were from an underserved population who scored particularly low on the tasks at baseline. Secondly, the choice of the measurement tools were appropriate for this age, especially given the lack of standardised assessments available, and the tools were sensitive enough to show change over time in this population. Third, the 6-month timeframe of the study allowed the music practitioners to settle into their role in the nursery setting and for necessary adjustments to be made when issues arose with nursery staffing. This length of programme was also key in producing reliable child assessments at two different time points, which is not possible when testing is conducted over short time intervals. Additionally, the study engaged multiple music teachers in multiple settings which removes the attribution of intervention effects to the impact of the specific skills of one music practitioner.

The two key limitations of this study are the small sample size of children and the lack of an active control condition that would allow us to rule out the impact of having an extra member of staff and receiving increased training in general, relative to the control groups. Providing this intervention in tens of settings with hundreds of children, whilst including a concurrent arts training programme would effectively remedy these two limitations. And would ultimately provide a more robust argument that the intervention material and methods of delivery are producing the shown effects.

In terms of programme implementation limitations, the study faced issues with staffing in the nurseries - at both intervention settings a member of staff left the setting part way through the project. Additionally, settings were often short staffed (ratios of children to staff there were not met), staff had low levels of education and there were multiple absences due to covid. Despite these various challenges, significant improvements were still demonstrated across both intervention groups on all tasks, suggesting that this programme has the potential to be highly effective for this demographic of children.

Conclusion

Despite a number of challenges, Sound and Symbol has had many successes.
The findings from the assessments carried out by the researchers are extremely promising and we hope that they will make a valuable contribution to the development of work in this area. These cohort-level results are also complemented by stories of what this project has meant for individual children and practitioners and the power that music has to create a space where people can understand themselves and others differently.

One EYP described how she often had to take children into the foyer because the classrooms were too full. There were few resources in this space and it was tremendously challenging for her and the children. As she worked alongside the MP, she began to use more and more musical activities she had learnt in the foyer. She said "*I feel like it's something which is fun for me, and the children enjoy it – now they are clamouring to come outside with me*". We are extremely pleased to have been able to contribute to this sense of joy in enormously difficult circumstances.

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