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RESEARCH REPORT

Preliminary feasibility and effectiveness of a novel community language intervention for preschool children in the United Kingdom

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Abstract

Background: Very young children from lower socioeconomic status (SES) backgrounds often show poorer language development. Whilst there have been attempts to provide early intervention programmes, these sometimes miss the most disadvantaged groups.

Aims: This report presents preliminary feasibility and effectiveness data for a novel language intervention designed for parents of toddlers in the United Kingdom.

Methods and Procedures: In total, 43 UK families of 2–4-year-olds were recruited to the study, half of whom completed an 8-week course (Tots Talking) focussed on parent interaction, and half of whom acted as wait-list controls.

Results and Outcomes: Results suggest that such programmes are feasible for families with 86% staying in the intervention. In addition, greater changes in underlying communication skills such as joint attention and gesture were evident compared to wait-list controls.

Conclusions and Implications: We conclude that pre-verbal skills may be more important to measure as initial outcomes than language or vocabulary change in this population.

KEYWORDS
Intervention, joint attention, parents, pre-school

What This Paper Adds

What is already known on the subject

Children from lower socioeconomic status (SES) backgrounds are at higher risk of communication difficulties and there is a need for community intervention programmes for very young children.

What this study adds

This study suggests that such programmes can be feasible and effective, but that very early/basic communicative skills (such as joint attention) may be boosted first rather than language or vocabulary.

What are the clinical implications of this work?

Children's centres and other community services could feasibly run short parent facing courses emphasising contingent communication in low SES families and other diverse groups. These may be more successful run with younger preschoolers. Joint attention may be a better focus of intervention before expecting vocabulary or language change. Community health professionals may find this information useful in referring and supporting families in need.

INTRODUCTION

In recent years there has been a growing recognition by researchers and clinicians, of the language development gap experienced by children from families with low socioeconomic status (SES) or living in less privileged circumstances (i.e., where parents have lower education, income, job security/status or space at home; Brooks-Gunn et al., 2010). Despite this there are few programmes that attempt to reach these groups and offer a feasible intervention for parents who are less likely to attend and engage with regular parent–child interaction therapies (Walker et al., 2020). This paper presents a preliminary evaluation of a novel intervention for this group of preschool children in the United Kingdom.

Early parent–child interaction as factors in language development

Certain aspects of early interaction seem to be particularly important to language development. One aspect, joint attention, is the active coordination with another person of shared attention to objects or events (Trevarthen & Aitken, 2001) and has been shown to strongly predict later language development (Mundy & Gomes, 1998; Salo et al., 2018). During early development, parents often scaffold their infant's early interaction by creating linguistic and non-verbal communication opportunities via joint attention and gesture (Morgan et al., 2021). In addition, fluency and connectedness of the interaction are sometimes found to be important to language development (Adamson et al., 2019; Smith et al., 2019). Infant and toddler language itself may be minimal, especially in lower SES groups (Hoff, 2013). Thus, to encourage communication, effective adult interaction involves adjusting input at various levels by noticing the child's focus of attention and offering contingent gestures and comments. This enables the child to create meaningful representations via these small gestures, rather than the parent directing the child's attention to something new (Neale & Whitebread, 2019; Papafragou et al., 2018).

Early communication and social disadvantage

Children from lower income families may have fewer opportunities for high-quality interaction including contingent communication and joint attention. This may be due to busier or less well-resourced home environments where there is a lack of books and enriching activities such as singing, baking, making things, which provide these everyday communication opportunities (Dearden et al., 2011). As outlined previously, there is ample literature indicating that early parent–child interaction, including non-verbal behaviours such as gestures and joint attention, is associated with developing language skills (Choi et al., 2021; Schwab & Lew-Williams, 2016; Vallotton et al., 2017). In disadvantaged families, a more limited use of book reading (Buckingham et al., 2014) and fewer enriching or cognitively stimulating activities (Dearden et al., 2011; Sultana et al., 2020) are reported, although the pathways are complex, and there is substantial heterogeneity (Burris et al., 2019).

Evidence also suggests that children living in social disadvantage have lower vocabulary levels (Rowe, 2022) and that early language, in turn, predicts wider outcomes later in life (Eadie et al., 2021). This creates what Neumann et al. (2018) refer to as a 'double dose of disadvantage'. The Early Language in Victoria Study in Australia found social disadvantage to predict language outcomes at age 4 (Reilly et al., 2010). Moreover, they later found language at 4 years to strongly predict language and academic achievement at 11 years (Eadie et al., 2021). Children diagnosed at school age as having a language impairment show poorer literacy (Botting, 2020), employment prospects (Conti-Ramsden et al., 2018), mental health (Botting et al., 2016) and social

skills (Durkin et al., 2017) in young adulthood. Social disadvantage also associates directly with poorer educational outcomes for these children than their peers (Gregg & Machin, 2001). Thus, it is important to address early interaction in children where language development is at risk and reducing this attainment gap has been recognised as a UK government commitment (Macleod et al., 2015).

Communication interventions for low SES toddlers

Much of the literature on parent–child interaction is aimed at addressing behavioural issues (Thomas et al., 2017) rather than communication. Most of the evidence on early communication intervention involves children with autism (Walker et al., 2020). However, other groups of underserved children whom health visitors and other early years practitioners see on a regular basis might also benefit from bespoke intervention programmes. As noted earlier, the rich language environment characteristics that create communication opportunities (such as shared reading, family mealtimes, making, playing, baking activities) may not feature as clearly as part of the developmental experience of children living in low SES families (Sultana et al., 2020), and this may often be because parents have had less experience of these themselves and fewer opportunities to learn from other parents about how to create those opportunities. In addition, these families may have cumulative burdens meaning that they drop out or fail to attend intervention sessions (Bagner & Graziano, 2013).

Increasingly, studies are emerging in the literature evaluating interventions for non-autistic, low language groups. There is generally a lack of information about the active ingredients of speech and language interventions for children, although some possible elements that have been identified are active child engagement in the intervention (Schmitt, 2020), recasting (McKean & Frizelle, 2022) and contingent interaction (Mathews et al., 2017). In general, intervention studies also often lack control groups (Kwok et al., 2020; *Target Word*), are aimed at children over 3 (Dicataldo et al., 2020; Walker et al., 2020) or are very small case series that cannot be analysed statistically (McDonald et al., 2019; *Home Talk; n = 9*). All of these are problematic design features given the rapid changes and wide individual differences often seen at this age. A few controlled studies have seen some effects, but these have not lasted until follow-up (McGillon et al., 2017; *Novel intervention*) and often recruit well-educated parents (Kruythoff-Broekman et al., 2019; *Target Word*). In Walker et al.'s (2020) review, only 35% of intervention studies aimed to address the needs of low SES families, and even then, studies rarely included parental education levels. Thus, there is a need to continue testing the feasibility and effectiveness of interventions for diverse groups.

Present study

The present study evaluates the feasibility and preliminary effectiveness of a new community-based intervention, Tots Talking (TT), developed by Speech and Language UK charity (formerly ICAN), aimed at families from disadvantaged or at-risk groups. The original aim was to see whether the project was feasible and whether it could improve children's language, which is the main aim of TT. These aims are reflected in RQ1 and RQ2. However, secondary post-hoc exploratory analyses were then conducted looking at whether there were changes in wider communicative gestures, because these form part of the intervention content and may represent the first behavioural change noticeable in the absence of vocabulary changes. These are outlined in RQ3. We also explored whether any factors appeared associated with improvement within the TT group in order to inform future studies, which are represented in RQ4.

RQ1: Was the TT intervention and the programme evaluation feasible?
RQ2: Did TT show any preliminary outcomes for language over and above natural development?
RQ3: Were there changes in the non-verbal communication features of joint attention and gesture for the TT group compared to the comparison group?
RQ4: What factors, if any, were associated with a positive response to intervention?

METHOD

This evaluation assesses the feasibility of Tots Talking and compares the progress of language and gesture of children who were either actively enrolled in the programme or were part of a waiting-list comparison group. Group allocation was randomised by setting. Ethical approval for the study was granted by the Speech and Language UK charity's own board as well as the City University of London, Language and Communication Science Proportionate Review (LCS PR) research ethics committee [ETH-2021-0359]; see further details under evaluation procedure. The feasibility was explored in terms of recruitment, attrition and assessment attendance, as well as via informal parent feedback.

Tots Talking programme

The TT programme is aimed at parents/carers of 2-year-olds who were identified by children's-centre staff as living in disadvantage and as being at risk of developing language difficulties language because of limited parent–child interaction. Children were not clinically identified as having language difficulties, and so the TT programme ethos is one of prevention rather than treatment.

The two aims of the intervention programme were to encourage contingent language and support the development of toddler's language and communication skills. The programme was based on evidence from the Nuffield Foundation suggesting that contingent language might be important for optimum vocabulary growth (Mathews et al., 2017). The coaching was loosely structured around a COM-B framework of behaviour change (Cane et al., 2012) in that it aimed to educate parents about early communication, whilst providing concrete and motivating methods of creating opportunity for optimum interaction. The intervention groups consisted of 6–8 parents/carers and ran once a week for 1 hour for a total of 8 weeks and creche facilities were provided for the toddlers. The groups were further supported via the Tots Talking app whereby parents downloaded an app and reminders were sent to encourage them to practice what they had learned that week with their children.

The manual states that Tots Talking: 'gives information about two year olds' language development; explains the link between two year olds' language skills and being ready for nursery and school; explains what contingent language is and how to do it; is easily accessible—low/no literacy required; helps parents create games and toys, and practise using them; uses film clips to show examples and encourage discussion; has role-plays and coaches on how to use contingent language and play with toddlers; gives ideas for things to do at home (using the app); enables parents to check their child's progress in talking (using the app); is fun and enjoyable!—it's not judgmental or 'teachy'.' (p. 5; See Appendix A for an example session).

Unlike traditional Parent-Child Interaction approaches, parents are not videoed with their children as part of the programme, in order to avoid pressure that certain groups do not respond well to. Parents are not invited with the explicit aim of 'improving their child's language' but are told that it will give their children a head start for school. Each session encouraged an exploration of materials together with the discussion facilitated, rather than directed, by the trained practitioner. The aim was to encourage behaviour change rather than teach specific activities or strategies. Observation of videos showing contingent and non-contingent behaviours led to a discussion of behaviours commonly including noticing utterances, non-verbal gestures and joint attention. The intervention is manualised into session templates and run by early years practitioners who have undergone Tots Talking training. Each week the sessions includes four or five activit ies:

- How was your week? Discussion and queries;
- Did you know? An activity introduces a fact about children's language development for parents to think about, followed by a film clip and discussion;
- Watch this: Film clips—called Spot the Difference—of a mother, Lynsey, and her 2-year-old son, Eddie. These film clips show both contingent and non-contingent language and behaviours so parents can see the difference.
- Make this/Play this and try it at home: An activity to make—or play—a game or toy to use at home.
- Talk about this: A topic to discuss with the parents (in some sessions).

Recruitment

Families were recruited from eight community children's centres or early years settings in two disadvantaged demographic areas in the United Kingdom—rural South West England ($n = 4$); and urban North West England ($n = 4$). All settings in the targeted local authorities were invited to recruit, but three from the North West (seven invited in total) and one from the South West (five invited in total) dropped out due to staffing and difficulties recruiting families. Overall, 57 families were invited to take part in the study with the added incentive of a t-shirt and gift. Families from disadvantaged backgrounds were identified by the children's setting as those receiving the 2-year-old childcare-support-offer (i.e., entitlement to the 15 hours of free early learning scheme for 2-year-olds as enrolled by the UK government https://www.gov.uk/help-with-childcare-costs/free-childcare-2-year-olds). All parents invited were in receipt of this offer and were also felt to be at risk of language difficulties due to limited parent–child interaction observed by setting staff.

MEASURES

Feasibility data

Information about recruitment, attrition and assessment completion was collated into a central database by TT facilitators. No information was available about individual session attendance. To understand the impact of attending the Tots Talking group parents who attended the groups were asked to give their views. This information was

collected in two ways: in a focus group at the end of the programme; and in telephone interviews with the monitoring and evaluation coordinator. The majority of the participants did not answer phone calls from unknown telephone numbers or return voice messages and none of the group replied to emails. In an attempt to interview a wide range of parents, the monitoring and evaluation coordinator sent a text to each parent explaining who they were and asking if they wanted to take part in a call. She agreed a time with the parents who responded and texted them half an hour before the agreed time to remind them she was about to call and checking this time was still convenient. The focus groups were video recorded and transcribed and three out of five telephone interviews were audio recorded and transcribed. The other two were not recorded but extensive notes were taken during the telephone call. One focus group was conducted in each of the two geographical recruitment areas. Four telephone interviews with parents in the North West and one with a parent in the South West were conducted. In total 13 parents gave their views about TT. No specific information about the demographics of the parent feedback subsample was collected.

Expressive vocabulary

McArthur-Bates Communicative Development Inventories (CDI) (Fenson et al., 2007) is a standardized parent-report measure of children's vocabulary development. Parents are given a list of 395 words across 19 categories and asked to indicate whether their child says these words. All parents completed the CDI at time one (baseline) and time two as a measure of children's expressive language abilities. Administration was done via a tablet with the support of an assessor.

Receptive vocabulary

A novel dynamic task of receptive vocabulary—the *City Assessment of Receptive Language in Infancy (CARLI)* was used because of the limited receptive language tasks available for this age range and attention-capacity. The CARLI is based on work by Spicer-Cain et al. (2023). Children were shown a series of 10 items, in two stages, which were taken out of a bag and placed in front of the child, without naming them. The items (PT1: cup, car, duck, ball, spoon; PT2: helicopter, strawberry, dinosaur, octopus; ambulance) were chosen to represent words a child would typically acquire as part of their early vocabulary. For part 1 words are expected within the second year of life, are all one syllable, and feature on the CDI1 (Fenson et al., 2007). Part 2 words are all expected to be acquired between 24 and 36 months, have 3–4 syllables and are included on the CDI2 (Fenson et al., 2007). For each of the items, the assessor pointed to the array of items. The child was then asked to give one of the items to the assessor who held out an open palm. A cueing hierarchy indicating the level of prompting needed was then used to score each item. Items were returned to the array after each had been tested, so that the child was always looking at a choice of five items (see Spicer-Cain et al., 2023 for more details).

Non-verbal communication

Researchers recorded approximately a 10-min interaction between the children and their parents in the children's setting. The setting was the same across time points to minimise environmental confounds. The same toys were provided at both recordings at time points 1 and 2 by the researchers (Please see Appendix B for the full list of toys). Videos were recorded using small digital recording devices by one of the group facilitators. Prior to the video-recordings parents were informed that they were being videoed playing with their child. Video observations were available for 23 children (10 active and 13 controls) at both T1 and T2.

Two key aspects were recorded for frequency: initiated joint attention (IJA) and parent and child hesture. These elements were chosen because in the literature these non-verbal elements of communication are often linked with later language (Morgan et al., 2021; Neale & Whitebread, 2019).

*Initiated joint attention—This score was a combination of child's eye contact, pointing, showing and attention-directing language observed over the whole 10 min at times 1 and 2.

*Parent and child gesture—The gesture coding scheme developed by Iverson et al. (1999) was used as the basis for coding parent and child gesture. The frequencies for individual gesture types in this scheme (e.g., deictic, representational, iconic) were too low for group comparisons. These were therefore combined into a total gesture score for both parents and children. Gestures counted included deictic gestures used to establish reference in the immediate environment (an object person, location, or event) such as pointing, showing, giving and reaching; representational gestures such as representing the movement or shape of an object or action; conventional/social gestures (e.g., waving); and ritualized reaching (open and closed palm gesture).

Evaluation procedure

Assessments and intervention took place between January and July 2019. Settings were randomised as being 'active' or 'control' settings within each geographical area. Thus 2 × settings in the South West and 2 × settings in the North West were allocated intervention status. The control settings received the Tots Talking programme at a later date and so were not disadvantaged. Children were assessed at three time points: pre-intervention (Time 1) and post intervention (Time 2). Some children were assessed 10 weeks later (Time 3) but there was too much missing data (n = 13/43 with full data sets; nine active and four control) to analyse further. There was a mean gap between time 1 and time 2 of 18 weeks (range = 15–25 weeks). Video raters were blind to intervention condition, time point and other child characteristics such as language scores. The evaluation received ethical approval by an independent panel serving the Speech and Language UK charity. The analysis of video data received independent ethical approval from City University of London. All parents gave informed written consent to be part of the evaluation and for videos to be viewed by researchers at City. Each video was securely placed on a secure online drive via. OneDrive. Researchers were required to verify their identity via a City University verified email address before gaining access to the videos. The videos were watched in a private and confidential environment to ensure participants confidentiality. The videos were not transcribed. Instead, student researchers coded the videos by watching and re-watching, and recording frequencies of non-verbal communication. Where the behaviours of parents or children were not clear on the video (for example, where they were not facing the camera) these were not coded.

Eight videos across group and time points were re-coded by an independent rater (30% of videos included in analyses—discussed later). Inter-rater reliability was calculated using intraclass correlations between raters on each of the frequency scores. They were found to be 'good' for all codes (Cicchetti, 1994): Joint attention (intraclass correlation coefficient [ICC] = 0.70; 95% confidence interval 0.52–0.93); parent gesture (ICC = 0.70; 95% confidence interval 0.62–0.90); and child gesture (ICC = 0.68; 95% confidence interval 0.50–0.91).

Analysis

Feasibility information was presented descriptively. The preliminary outcomes were analysed using SPSS v.28 and a two-way mixed analysis of variance (ANOVA) approach (group × time). All dependent variables showed acceptable levels of skewness (between −2/+2; George & Mallery, 2010). Levene's test for equality of variance was non-significant for all variables except joint attention at time 2 (p = 0.024). None of the mixed ANOVAs violated Box's M test of equality of covariance. We acknowledge that power is relatively low for these given the sample size, and to help interpretation in this context we have included effect sizes. We also re-ran the vocabulary analysis using two Wilcoxon tests for each group separately, to explore an interaction not detected via ANOVA due to power issues. Correlations were used for the intervention group only (n = 11), to explore any child factors that might warrant consideration in further research or when running similar parent groups. Non-parametric Spearman statistics were used for these due to smaller sample size when only one group was the focus. Apart from these exploratory analyses (for which effect sizes are the main focus) there was only one analysis per dependent variable, and adjusting p thresholds would increase type II errors further, thus an alpha level of $p <$ 0.05 was applied throughout.

RESULTS

Feasibility

Participants

A total of 43 of the 57 child–parent pairs who were invited agreed to take part in the study (75%), with between 4–7 children enrolled at each children's centre. Of these 43, 20 were in an intervention group setting, and 23 were in a wait-list control setting. Randomisation was by setting (each centre assigned a status) and this was not done until after parents were signed up to the study, to help limit recruitment bias.

At time 1 the overall mean age range of children in this sample was 30.26 months (SD = 4.83), with 24 females and 19 males. The majority of parents in the parent sample were mothers (N = 42) with one father. For 39 parents, demographic data were available. Five (11.6%) children had English as an additional language (EAL) and six (14%) had special educational needs and disabilities (SEND). All children were from white UK families except two who identified as white non-UK. Most parents (n = 23) fell in the 25–34 age bracket, with 12 between 35–44, three parents between 18 and 24 years of age, and one over 45. Maternal education data were collected in a broad-brush manner, because detailed questions about qualification grades are one element that introduces bias into which families take up offers of intervention. Our data indicated that most mothers had basic Level 2 high school education (n = 16,

TABLE 1 Demographic characteristics for participating families by group and by video data subgroups

TT participation families	Child sex (m/f)	Child age (mths) (Mean; SD)	Maternal education (Median; IQR)	EAL	SEND
Intervention ($n = 20$)	9/11	31.0 (5.6)	Level 2 (2–3)	4 (20%)	2 (10%)
Control ($n = 23$)	10/13	29.3 (4.6)	Level 3 (2–4.5)	0 (0%)	4 (17%)
Families with video data					
Intervention ($n = 10$)	5/5	31.7 (6.2)	Level 2 (2–2)	2 (20%)	1 (10%)
Control ($n = 13$)	6/7	30.6 (3.9)	Level 2 (2–4.5)	0 (0%)	4 (31%)

Abbreviations: CI, confidence interval; EAL, English as an additional language; IQ, interquartile range; SEND, special education needs and disabilities; TT, Tots Talking.

55.6% had one or more UK GCSE (General Certificate of Secondary Education; we counted all grades as Level 2). Six had no formal qualifications, one had level 1 qualifications; 10 had higher, Levels 3 or 4 qualifications (UK Advanced 'A' levels/National Vocational Qualifications 3 or 4); and 6 had degree level qualifications (Levels 5 or 6).

Table 1 shows the demographic information for the 43 families who signed up by intervention status, as well as the characteristics of the 23 children for whom video data was available.

There were no significant differences pre-intervention between the active and control groups on maternal education, maternal age, child age or sex, child vocabulary or SEN status suggesting that randomisation by setting was broadly effective. However, all five EAL children were in active settings.

Attrition, data collection and missing data

Families were generally willing and able to be assessed at baseline with no missing data. Six families (14%) dropped out of the intervention itself. No information was collected about how many sessions parents attended.

At time two assessment, only 26 children completed any assessments (26/43 = 60.5%; 26/37 attenders = 70.2%). Reasons for non-assessment were largely burden-based: sickness (1), medical appointments (2), childcare issues (2) and work commitments (3) as well as the child being unable to sit through the assessment (3).

Parent feedback

Parent feedback data are presented in full in Appendix C. Here we summarise some of the key themes that emerged.

One of the ideas expressed was about the **supportive social environment** of TT, where many parents expressed meeting other mums and feeling less alone.

> "It was really nice with all the women that were there who gave different perspectives and ideas which was really nice". Parent 1

> "Definitely before I thought I was alone but now I've gone on the [TT] course I've met other mums". Parent 4

> "I think it's been staffed really well, they are really nice and really quick and everyone relaxed straightaway. It's like a little family group". Parent 3

Parents also highlighted the new information learned about their own communication.

> "It gives you skills that you might not know about. Every one of us here is a first-time parent so we won't know necessarily and no one as much as you might be like "mum what does this mean?" It is only one person's view whereas obviously getting it from three mums and professional you get a good wide spectrum". Parent 5

> "Yeah because you don't think it's you, do you? You just think it's them playing up when he watched that you realise that everything is all about you". Parent 3

> "Doing like the activities weekly with the baby just that few weeks if doing it brought him on loads. Started saying more words, like doing the bubbles he started saying "pop" whereas before he never said stuff do you know what I mean?" Parent 2

As well as communication changes, parents noted the ways in which they felt their **children's behaviour** had changed.

> "It also helps with the behaviour as well when you're spending time with them in activities through language, because you are interacting with them and it's good behaviour what is the word? Where the things they are doing is not always naughty". Parent 8

> "Yes I have noticed a change in behaviour in my two boys with doing this. And all that we watched with the clips it's really helped with not just the language but the behaviour as well". Parent 9

Many parents noticed that **little things make a big difference** which was an important learning point.

> "It was good to see little tips of things that you do yourself because you know you do it and you think you know what sometimes just need to take that little step back and think why am I bothered its water, it's not my game let him play!" Parent 3

> "There's like lots of helpful tips. There's lots of little small ones that make quite a big difference example if they say the word wrong you don't say no you just repeat it to them. It's just a small change but it makes a big difference". Parent 7

Comments by parents **about the course structure itself** included the fact that it would have been useful earlier and for longer. The app was not useful for everyone, but some families found it especially useful for showing other family members.

> "Would have been better to start when B (son) was younger. He was already 2 and a half at the start and passed some of the activities". Parent 6

> "My only comment going forward would be a slightly longer session would be helpful I mean we had a nice group". Parent 1

> [About the app] "I think for me, my husband couldn't make it because he works so for me to be like 'this is what I am talking about' when I'm talking about the scenarios" .Parent 7

Preliminary vocabulary outcomes

Table 2 shows all means and SDs for outcome measures by group and time.

TABLE 2 Mean scores across time for outcome measures across each group

	Active		Control	
	N	Mean (SD)	*N*	Mean (SD)
CDI				
Time 1	11	64.45 (31.25)	15	59.47 (27.09)
Time 2	11	74.36 (29.48)	15	62.07 (27.28)
CARLI				
Time 1	11	11.91 (5.38)	16	11.38 (4.06)
Time 2	11	12.82 (4.02)	16	13.19 (3.90)
IJA				
Time 1	10	9.82 (11.05)	13	7.01 (6.35)
Time 2	10	21.80 (12.81)	13	7.15 (5.24)
Parent gesture				
Time 1	10	28.8 (11.92)	10	27.5 (9.70)
Time 2	10	25.20 (15.84)	10	18.50 (5.97)
Child gesture				
Time 1	10	12.40 (6.87)	10	10.89 (5.67)
Time 2	10	15.60 (10.65)	10	11.78 (7.07)

Abbreviations: CARLI, City Assessment of Receptive Language Impairment; CDI, Communicative Development Inventories; IJA, initiated joint attention.

Expressive vocabulary

CDIs at both time points were available for 26 children in total, 11 active and 15 controls.

There was no significant interaction effect ($F(1,24) = 1.98$, $p = 0.17$) but a medium effect size ($\eta_p^2 = 0.08$), suggesting that the sample size may not have been large enough to reliably detect a different pattern of change across time between the groups. There was a significant main effect for time ($F(1,24) = 5.79$, $p = 0.024$, $\eta_p^2 = 0.19$); however, the main effect for group was not significant ($F(1,24) = 0.69$, $p = 0.43$, $\eta_p^2 = 0.03$). See Figure 1.

The mean change in the intervention group was nearly 10 words on average, while the control group mean improvement was 2.5 words. Given this, and the fact sample was small and data slightly skewed with a moderate effect size, there was a suggestion that a type II error may have occurred. Therefore, two Wilcoxon tests were carried out to explore whether the change was significant for each group separately. This revealed that the control group change was not significant (median change from 60 (interquartile range [IQR] 45–80) to 71 (IQR 38–79): $Z = -0.80$, $p = -0.426$), whilst the active group showed significant change from 63 (IQR 37–95) to 89 words (IQR 51–100) ($Z = -2.7$, $p = 0.007$).

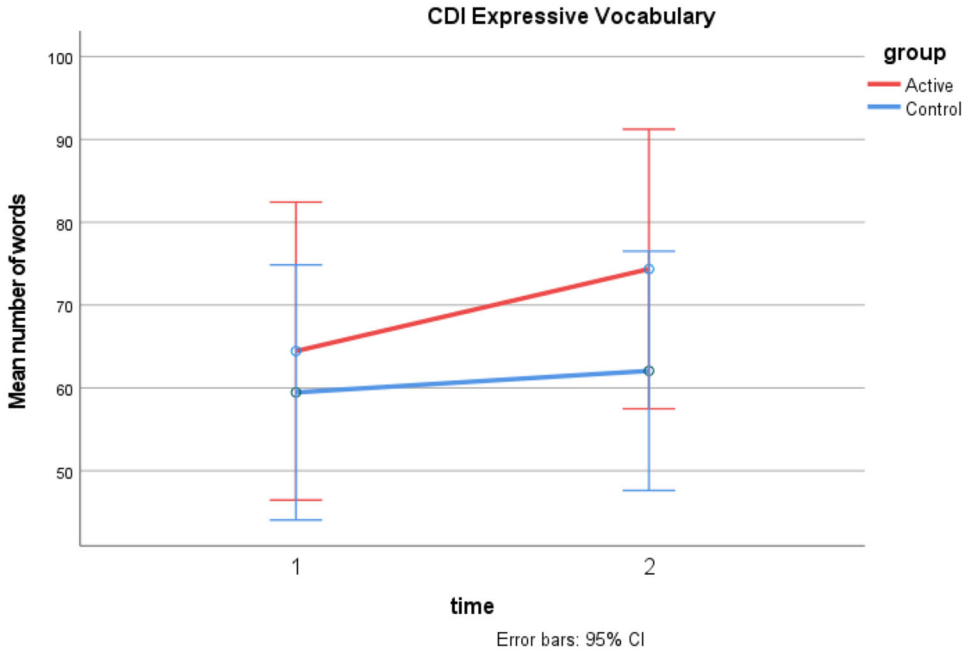

FIGURE 1 Mean CDI pre- and post-therapy across groups. Abbreviations: CDI, Communicative Development Inventories; CI, confidence interval [Colour figure can be viewed at wileyonlinelibrary.com]

Receptive vocabulary

No significant interaction effects were seen on receptive vocabulary between time × group ($F(1,25) = 0.24$, $p = 0.629$, $\eta_p^2 = 0.01$). There was also no main effect of time ($F(1,25) = 5.17$, $p = 0.154$, $\eta_p^2 = 0.08$) or group ($F(1,25) = 0.03$, $p = 0.954$, $\eta_p^2 < .01$).

Preliminary non-verbal communication outcomes

Child initiated joint attention

There was a significant interaction effect ($F(1,21) = 6.92$, $p = 0.016$, $\eta_p^2 = 0.26$), suggesting there was a different pattern of change across time for the active group versus the control where the active group showed more improvement than the control group. See Figure 2. There was a significant main effect for time ($F(1,21) = 7.282$, $p = 0.013$, $\eta_p^2 = 0.26$). The main effect for group was also significant ($F(1,21) = 8.26$, $p = 0.009$, $\eta_p^2 = 0.282$).

Parent and child gesture

For number of parent gestures, there was no significant interaction effect between time and intervention group ($F(1,18) = 0.704$, $p = 0.412$, $\eta_p^2 = 0.040$) and no significant main effect of time ($F(1,18) = 3.834$, $p = 0.066$, $\eta_p^2 = 0.176$) or group ($F(1,18) = 1.014$, $p = 0.327$, $\eta_p^2 = 0.053$). The total number of gestures made by children were explored and a similar pattern was observed. There were no significant effects: Interaction effect: ($F(1,17) = 0.33$, $p = 0.575$, $\eta_p^2 = 0.02$). Main effect of time: ($F(1,17) = 1.02$, $p = 0.326$, $\eta_p^2 = 0.06$); Main effect of group: ($F(1,17) = 0.79$, $p = 0.385$, $\eta_p^2 = 0.05$). Note, however, that some of these analyses had medium to large effect sizes. See Table 2 for means and SDs.

Exploration of potential predictors of change during intervention

Exploratory correlations were run for the intervention group for each of the outcomes above to see whether any child/family factors predicted better response to treatment (i.e., change the outcomes). These included demographic information, as well as baseline scores. While these should be treated with some caution because of small sample sizes, a number of analyses showed medium (rho > 0.3) or large effect sizes (rho > 0.5) which we believe may be useful for future studies and of clinical interest. Table 3 shows all correlations between potential predictive factors and outcome measures. Overall, it can be seen that younger child age and lower levels of language pre-intervention associate with more change in vocabulary and joint attention (although higher age and language relates to more change in gestures); lower parent gesture pre-intervention may also be

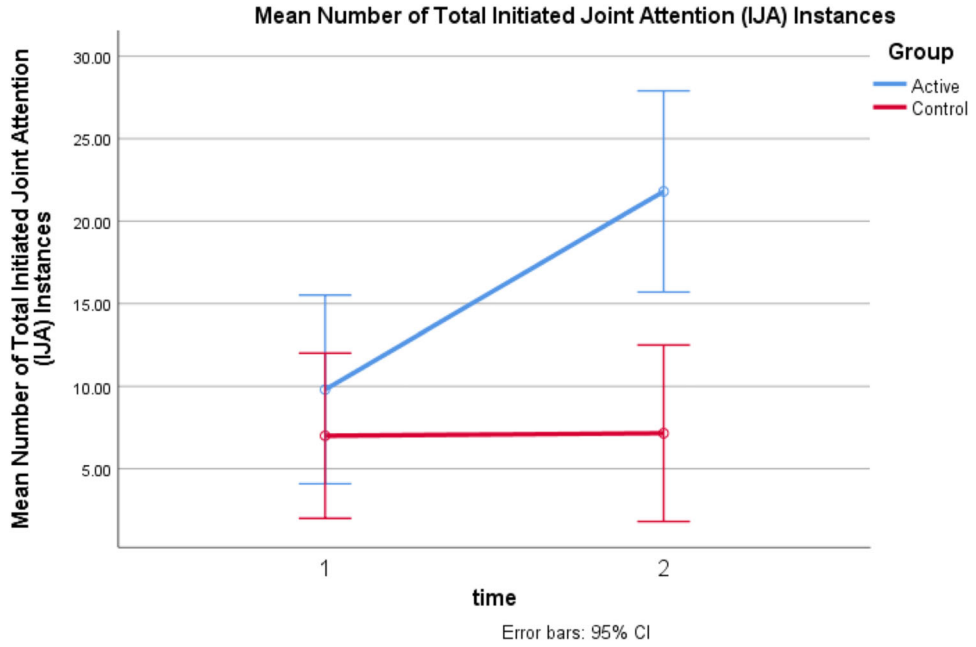

FIGURE 2 Mean number of Total IJA events. Abbreviations: CI, confidence interval; IJA, initiated joint attention [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 3 Exploratory correlation table for potential predictors of change.

	CDI change	CARLI change	IJA change	Parent gesture change	Child gesture change
Maternal education	−0.537	−0.284	−0.285	−0.113	−0.147
Caregiver age	−0.227	0.406	0.337	−0.255	−0.091
Child age	−0.516	−0.678*	−0.519	0.327	0.412
CDI T1	−0.337	−0.256	−0.412	0.742*	0.201
CARLI T1	−0.431	−0.453	−0.312	0.506	0.370
IJA1 T1	0.151	−0.393	−0.506	−0.537	−0.735*
Parent gesture T1	0.059	−0.272	−0.328	−0.725*	−0.664*
Child gesture T1	0.084	−0.272	−0.214	−0.737*	−0.682*

Green shading indicates moderate correlations; blue shading indicates large correlations.

*Indicates statistical significance at $p < 0.05$.

Abbreviations: CARLI, City Assessment of Receptive Language Impairment; CDI, Communicative Development Inventories; IJA, initiated joint attention.

associated with more change on non-verbal aspects of communication.

DISCUSSION

This evaluation provides further evidence that preventative interventions aimed at lower SES families can be feasible. Children whose parents completed Tots Talking showed increased expressive vocabulary and joint attention (compared to control children). No change was seen for receptive vocabulary and gesture. Although expressive vocabulary saw some significant change during Tots Talking, the largest and most reliable gains are found in more basic communicative elements of joint attention. Gestures made by parents and children showed no significant difference in pattern of change depending on group, but the trends were towards increased maintenance of gesture (parents) and increased gesture production (children). Importantly, the TT programme is designed as a preventative measure rather than waiting until children show evidence of struggling with language in nursery or school settings. Enabling parents to create opportunities for optimum communication potentially leads to a sustainable and long-term change in parenting approach (although to the authors' knowledge no research has directly addressed this question). The qualitative feedback from the parents in this study suggest that this might be possible with an intervention such as TT.

We found that Tots Talking is a feasible programme to offer families from all backgrounds, with the majority signing up and completing the programme. This is especially promising given that families living in disadvantage often have challenges accessing such interventions (Walker et al., 2020). Our qualitative feedback suggests that a key factor in the success of TT was the safe environment created, the interactive and relatable nature of suggestions, and the fact that parents could share the intervention with others via the app. Although these factors have been investigated in mental health research (Garrido et al., 2019), to our knowledge these have not been systematically investigated for parent–child communication programmes.

However, the evaluation was less successful, with overall attrition of more than 50% at time 2 and 70% at time 3. For those that took part, the finding that the frequency of early initiated joint attention can change for low SES families via a short intervention warrants further study, since this underpinning behaviour is closely related to later language (Mundy & Gomes, 1998; Salo et al., 2018). However, we acknowledge that no follow-up data are reported for our sample beyond time 2. As noted, our feasibility findings suggest that adequate longer-term follow-up assessments with these families were very difficult to attain, with only a very small proportion of participants engaging post intervention. Other studies (McGillon et al., 2017) have shown that initial gains in language do not last. However it is possible that the focus of outcome in those studies was not appropriate—our findings suggest that for low SES families, a shift in vocabulary may be unrealistic before changes in joint attention are seen. Further research is needed to establish whether changes seen in joint attention after Tots Talking translate into a sustainable shift in parent behaviour and greater language gains at older ages.

In terms of predictors, some promising overall patterns emerged. The best responders to the intervention were younger children, with lower starting vocabularies, who had less well-educated mothers. This is particularly important given the aims of this programme to reach families who sometimes find it difficult to access other types of support, or who may be missed in the referral process. Interventions such as Tots Talking need to be feasible not just for families with good organisation and educational skills, but also the families most in need. However, better child gesture at time 1 also predicted favourable change in gestural outcomes indicating perhaps that the children most receptive to intervention were those communicating well non-verbally. This maps on to early work that postulates higher levels of gesture alongside lower levels of language may be an indicator of readiness for development or training (Perry et al., 1992; Pine et al., 2004). Further research is needed to investigate this more systematically.

Limitations

As noted our sample is small and no follow-up data beyond time 2 was available. One of the strengths of the study is that the TT programme is designed as a preventative measure; however, this means that it would be useful in future to assess children at school entry to ascertain whether there were long-term benefits. In addition, although some information about attrition was documented, it is an important limitation that no information about session attendance was gathered. This is often the way with independent evaluations of clinical initiatives and we believe that given the target population, the amount of families who remained in the programme overall meant that the intervention is feasible. Nevertheless, detailed attendance data would be useful in predicting who engages most with the intervention, and whether those who attend more sessions show the most change. In addition, we do not have detailed information about the burdens experienced by each family, or the factors that enabled or prevented completion of the programme or evaluation assessments. Further qualitative studies are needed that go beyond the metrics of SES and explore with parents the factors that affect engagement. No data were collected regarding implementation fidelity which would be another important next step in evaluating the Tots Talking programme.

There were also certain issues with the collection of evaluation data which are useful to note for similar evaluations of practice. Firstly, although we were able to video parents and children with just one person filming (limiting opportunities for wider communication and distractions), this meant there were times when the face of the child or adult was not clearly shown (because the child had his back to the camera for example). Thus we may have missed some non-verbal communication of interest. However, these instances were rare, and there is no reason to believe that this coding limitation differed across group or timepoints. Professional lab-style filming equipment would be ideal for capture; however, this would not have been possible (or socially desirable) for measuring behaviours this sensitive client group, being recorded within a clinical setting. Second, although language and communication were not highlighted at recruitment, nor before the videos, parents had completed the CDI checklist just before filming. In some instances, we feel this may have encouraged parents to engage in more naming behaviour rather than contigent communication behaviours. This speaks to the careful consideration of the order of assessments in clinical research and practice.

Finally, it is important to note that the data presented in this study were collected pre-COVID. There are early indications that vocabulary learning has been affected for children who were under 5 during the pandemic, although

this evidence is mixed with some reporting poorer vocabulary (Byrne et al., 2022) and other studies actually reporting an increased rate of development for some, including children in lower SES groups (Kartushina et al., 2022). This study therefore needs replicating for the new generation of post-pandemic children.

CONCLUSIONS

Despite the limitations, our study has shown that it is possible to recruit and retain families living in disadvantaged or complex circumstances; and that this type of community intervention might lead to improved early communication skills. Thus, these outcomes make a strong case for prevention work in early child language development. Community health care practitioners may be able to use this information to effectively direct and refer families to appropriate support. However, initial changes are not likely to be immediately visible in the form of vocabulary growth, instead programmes may be best suited to targeting and measuring change in non-verbal prerequisites to language. Through such fundamental communication enhancements, the hope is that the gap in language can be narrowed via programmes such as Tots Talking.

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CONFLICT OF INTEREST STATEMENT

L. Wood, J. Flynn and L. Reeves are staff members at Speech and Language UK and developed the Tots Talking Programme. However, the analysis of data was performed independently by the City team (NB, HSC, BB, EM, KS). No financial conflicts of interest exist.

DATA AVAILABILITY STATEMENT

An anonymised core data set is available from the first author on request.

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APPENDIX A
Example session

Week 1			
Activity	Time	Learning objective activity description	Resources
Why are we here?	10 mins	Finding out what the group is all about What will happen in the next 8 weeks, and downloading the Tots Talking app	• Register
Getting to know you	10 mins	Getting to know each other Parents find out what other people in the group like or dislike	• Resource: Getting to Know You (copy 1 for each parent)
			• Balls of coloured wool (1 for each parent)
Did you know?	15 mins	How babies' brains develop Play the film and ask parents for feedback	• Film Clip 1: NSPCC: Growing an Emotional Brain [00:00 - 06:10]
			• Resource: Feedback Cards (copy 1 set of 4 for each parent)
Watch this	10 mins	Spot the Difference The film clip shows examples of contingent and non-contingent language Parents think and talk about what they see	• Film Clip 2: Spot the Difference: Getting Dressed
Play this	10 mins	Blowing Bubbles Parents use bubbles to think about how to support their child's language	• Bubble blowers (1 for each family)

APPENDIX B: LIST OF TOYS FOR VIDEO ASSESSMENT

* Paper and crayons
* A toy phone
* Talking Upsy Daisy doll (a character from a popular children's television show)
* Toy cars
* A cup, bowl, brush and spoon
* Construction items such as Lego Duplo and stickle bricks
* A chunky jigsaw puzzle
* A large scarf
* Drop and Roll ball set

APPENDIX C: PARENT FEEDBACK COMMENTS

Supportive social environment

"I think the main thing I liked was it made me feel I wasn't so different with me child. I realised L (son) wasn't as far behind, he wasn't so different and he's his own person. Whereas before I was like is everyone else's child talking". Parent 3

"Exactly, just the social stuff of seeing other people. It was nice to even go to the crèche, the crèche was amazing, to see his confidence go up from the crèche and even they were saying he's fantastic". Parent 3

"It was really nice with all the women that were there who gave different perspectives and ideas which was really nice". Parent 1

"Definitely before I thought I was alone but now I've gone on the ICAN course I've met other mums". Parent 4

"I think it's been staffed really well, they are really nice and really quick and everyone relaxed straightaway. It's like a little family group". Parent 3

"It didn't feel belittling; it didn't feel like it was to get you". Parent 1

"It's not like she's there to say "oh you should be doing this and you should be doing that" but she had some really helpful things that for me as a first-time mum I didn't know especially when it comes to talking". Parent 1

New information about parent communication style

"It gives you skills that you might not know about. Every one of us here is a first-time parent so we won't know necessarily and no one as much as you might be like mum what does this mean? It is only one person's view whereas obviously getting it from three mums and professional you get a good wide spectrum". Parent 8

"If I'd have known the science before I'd have moved my own expectations (of her older sons)". Parent 1

"Yeah because you don't think it's you, do you? You just think it's them playing up when he watched that you realise that everything is all about you". Parent 3

"In general, especially as a first-time mum as well. You are not going to know everything and even little things like I remember saying if I said oh there's a dog" and one of mine said "dog" I would be like "good boy" but now I will be like "yes it's a brown dog and add in and I didn't know that before. Even little tiny tips like that are just really helpful". Parent 3

"I am a lot calmer before I was getting all worked up…he can see I understand him now. Before I literally did not have a clue it was all guess work". Parent 4

"Doing like the activities weekly with the baby just that few weeks if doing it brought him on loads. Started saying more words, like doing the bubbles he started saying "pop" whereas before he never said stuff do you know what I mean?" Parent 3

"But walking home from Talking Tots I started to say red car" and he started to say "car and he hadn't said car before. Coz watching the video of the woman in the park with the kids, the two scenarios showing when you don't really interact with them when you could be interacting with them". Parent 2

"I know for me I was really bad, but not necessarily me both me and my husband, were really bad with phones and television and all the other things that you don't realise really distracting and you're not giving them 100%". Parent 10

"And I do that sometimes I try and teach him something rather than just letting him play and explore and learn naturally like that. And he was getting frustrated because she was taking over and I was thinking "you know what I do that and then I get to okay to play by yourself because I just can't be bothered". I thought do you know what I should just let him play, it'd be a lot happier for everyone". Parent 3

"When I started I've got twins who are 2 ½. So they would have been 2 and 3 months when we started and they had been referred speech and language. One of them was not saying anything he only did babble one of them would occasionally say "hi" very first stage words. After 8 weeks the one who would say hi will now copy everything he's like a little parrot. It definitely being with the help of the group, it's given me the tools to put that extra work in because I know what I'm doing now whereas I think you don't before necessarily. And the other one hears babble has got more intent and he's starting to say some words as well so massively massively improved". Parent 5

"I found more that he was listening to me I don't know if that was because I was more waiting for an answer and being patient but I found a lot of the time I probably, because he doesn't interact with me, I don't bother to make the effort to interact with him. Because I was on the course and we were getting tasks to do each time I was doing what they were telling me to do and interacting with him was actually really enjoyable because I could see him trying to interact back. So in the week I would do other things to interact with him that might not have been part of the course but it just gave me that boost to say come on let's sit down and try something" rather than "he's quiet I'll not disturb him". Parent 3

Impact on child behaviour

"He was really boisterous but now he is totally different, he is a lot more calmer…Even my mum and dad, family, have noticed". Parent 4

"If you make it into a game and get more language out of them it's just going to make it much calmer than them fighting just bored". Parent 2

"And the different things you say to them that encourages them to speak differently towards you as well and their behaviour". Parent 6

"It also helps with the behaviour as well when you're spending time with them in activities through language, because you are interacting with them and it's good behaviour what is the word? Where the things they are doing is not always naughty". Parent 8

"Yes I have noticed a change in behaviour in my two boys with doing this. And all that we watched with the clips it's really helped with not just the language but the behaviour as well". Parent 9

Little things make a difference

"There's like lots of helpful tips. There's lots of little small ones that make quite a big difference example if they say the word wrong you don't say no you just repeat it to them. It's just a small change but it makes a big difference". Parent 7

"It was good to see little tips of things that you do yourself because you know you do it and you think you know what sometimes just need to take that little step back and think why am I bothered its water, it's not my game let him play!" Parent 3

"It can be so small those changes to your language that make them act differently". Parent 8

"Interacting with them to play on the game not just 'play on that". Parent 11

Tots Talking course

"I don't know whether that was the course or just natural progression for him but I left the course thinking "you know what I've got no worries". I didn't think I was going to get that I thought it would just be a case of him still being behind and that I haven't learnt anything but at least I can say I've tried something. But I actually came away thinking "what am I worried about". To be honest I was only doing it to say to myself well at least I tried something to progress him so I wasn't expecting much. I thought "what can you do to make them talk, you can't really make them talk" but no it did help him and it helped me to relate to him a bit more and to encourage him kind of thing". Parent 3

"I think with mine because he's older it is more slight the differences. He's doing more sentences I don't know if that's because of the group because I am speaking to him differently or if it's just normal development but he is talking in more sentences, he talks a lot anyway (laughs) but better sentences especially in the last few weeks". Parent 6

"Yes a lot of changes, a lot of changes. I know some things I'm doing wrong and after this course I get a lot of tips the changes the way we handle it". Parent 13

"My friend is pregnant and I said to her "speak to the baby as soon as you can with all different nursery rhymes" I said "because the language that you give them the more they will come on in their language" and she said the "what, but it talking to my belly and I feel dead embarrassed". I said "why, you know, you need to get the language out of them and stuff". And I showed her some of the activities that we have done and the sheets and she was amazed". Parent 8

"I have talked to other people about what I have been doing like at work I know the couple of mums. I would say that this was something I was doing but it wasn't available yet". Parent 1

"Would have been better to start when B (son) was younger. He was already 2 and a half at the start and passed some of the activities". Parent 6

"One thing I would say, I think you know with 'em turning two I think you should do it a bit earlier you know so you're prepared for when they're starting to talk. So I wish I knew it a few months before he turned two because I think it would have bought him on a lot quicker". Parent 2

"Not really I think my only comment going forward would be a slightly longer session would be helpful I mean we had a nice group". Parent 1

Regarding the app: "I think for me by husband couldn't make it because he works so for me to be like 'this is what I am talking about' when I'm talking about the scenarios". Parent 7

Regarding the app: "My mum is quite keen to see them because she asks every week 'how did you get on, what did you do?' And it's hard to explain what we do unless you're in it". Parent 12

Regarding the app. "For my wife and I tell her what we are doing here, but I study here and I share that one and we are trying to make and mend what we were doing before". Parent 13