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Training preschoolers with language games: enhancing theory of mind, emotion understanding, prosocial orientation, and language ability

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ABSTRACT

In this study, we evaluated the effectiveness of a validated programme in enhancing theory of mind, emotion understanding, and prosocial orientation, as well as language ability (receptive vocabulary). Participants were 61 preschoolers (mean age: 54.03 months) attending two nursery schools, who were randomly assigned to either a training or control group. During the intervention phase of the study, the training participants listened to stories and then engaged in conversational activities drawn from the PSULG Programme, involving a word launching technique and language games. These procedures entail encouraging the use of mentalistic terms – drawn from story texts – during conversations between children, facilitated by appropriately trained adults. In contrast, children in the control group participated in drawing activities or free play after listening to the same stories. Children in both groups completed a battery of tasks during the pre-test and post-test phases of the research. Significant differences emerged between the two groups at post-test: trained participants significantly outperformed the control participants in language and global emotion understanding scores. Regarding theory of mind and prosocial orientation, we observed trends towards statistical significance. These results suggest that the PSULG Programme can positively impact children's social understanding in the preschool context.

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KEYWORDS Theory of mind; emotion understanding; language games; prosocial orientation; training study; conversational hypothesis

Introduction

This training study was informed by the social constructivist view (Carpendale & Lewis, 2021) that children's understanding of the social world develops through social interactions. Language and conversation significantly influence children's development of social understanding, also known as social

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cognition, which encompasses both theory of mind and emotion understanding (Grazzani & Ornaghi, 2022; Tompkins et al., 2019). Theory of mind (ToM) is the ability to recognize that both oneself and others possess epistemic mental states, such as desires and beliefs, which inform manifest behaviour. ToM is often investigated using batteries of tasks designed to capture the milestone achievement of attributing false beliefs to others – for example, the unexpected transfer task 'Maxi and the chocolate' for first-order false belief (Wimmer & Perner, 1983) and 'John, Mary and the ice cream van' for second-order false belief. Emotion understanding (EU) involves recognizing that oneself and others experience non-epistemic mental states such as emotions and affects. EU is frequently evaluated using the TEC or Test of Emotion Comprehension (Pons et al., 2004), which assesses children's grasp of the nature, causes, and regulation of emotions.

The role of language in the development of social understanding has been extensively investigated over the last 40 years. There is general agreement that children's language abilities and their language environments are associated with their theory of mind and emotion understanding, but how and to what extent remain open questions (Tompkins et al., 2018). On the one hand, cross-sectional and longitudinal studies have shown associations between language competence (e.g., vocabulary, syntactic competence) and both ToM (e.g., Astington & Jenkins, 1999; Farrar & Ashwell, 2012) and EU (e.g., Adrià n et al., 2007). More specifically, the better children's language skills, the better their theory of mind and emotion knowledge. In particular, some studies have shown that children's production of mental state language – terms indicating inner states related to perception, volition, cognition, emotion, and moral precepts – is a key marker of their ToM and EU (Dunn & Brophy, 2005; Milligan et al., 2007). Indeed, research conducted in family settings has demonstrated that the frequency and quality of mental state language during family conversational interactions predict later ToM and EU abilities (Wieczorek et al., 2025). In fact, the more mothers use mentalistic terms (nouns, adjectives, or verbs) when conversing with their children, the more likely the children are to succeed on theory of mind tasks (Adrià n et al., 2007; Rollo et al., 2017; Symons et al., 2006) and to use mental state language themselves (Taumoepeau & Ruffman, 2008). Further studies have demonstrated that when parents engage in shared book reading with their preschool children – particularly by reading them stories that have been enriched with mental state terms and discussing the story characters' socio-emotional and cognitive experiences – this is associated with gains in social understanding (Aram et al., 2013). Murray et al. (2022) recently reviewed studies indicating that shared book reading enhances both language abilities and social cognition.

On the other hand, the role of language in explaining children's performance on theory of mind and emotion understanding tasks has been corroborated by training studies in which experimental groups who

received individual laboratory training in language skills (e.g., vocabulary, mental state language, syntax) subsequently outperformed control groups on both ToM and EU tasks (e.g., Gola, 2011; Lohmann & Tomasello, 2003).

Research has also investigated how EU and ToM contribute to the development of prosocial orientation (PO), defined as a tendency to feel empathy for others and behave prosocially (Eisenberg et al., 2006). Studies have reported positive associations between EU and specific aspects of preschoolers' PO (Cassidy et al., 2003; Eggum et al., 2011; Ensor et al., 2011; Ornaghi et al., 2016), bearing out the notion that positive social behaviours require recognition of the needs and emotional states of others. Intervention studies have experimentally examined the effects of engaging young children in conversation about emotions. For example, Ornaghi et al. (2015) found that a training programme based on discourse about emotional scripts improved 4- to 5-year-old children's prosocial orientation as well as their emotion comprehension. Grazzani et al. (2016) reported similar findings even with 2- to 3-year-olds: toddlers who participated in training based on shared book reading and conversing about emotions were more likely to behave prosocially towards peers (a result also confirmed in the study by Brazzelli et al., 2021). More generally, a lack of emotional competence, including emotion knowledge, is associated with antisocial behaviour (Denham, 2023; Paulus, 2023). Regarding ToM, little is known about how it relates to prosocial behaviour in early childhood. Imuta and colleagues conducted a metanalysis of studies involving children aged 2 to 12 years, concluding that children with advanced ToM are more likely to act prosocially (Imuta et al., 2016). This link was consistent across different types of prosocial conduct – such as helping, comforting, and cooperating – but did not apply to sharing behaviours. In a recent study, Tsomokos and Raviv (2024) analysed data from a large sample of children ($N = 11{,}051$) in the UK, finding that children's verbal, mentalizing, and prosocial skills are interrelated. This suggests that targeted intervention can foster positive social conduct.

Promoting social understanding in preschool settings: The conversational paradigm

While numerous studies have examined parent-child interactions and conversations in family settings, and several reviews have been dedicated to this body of work (Mar, 2018; Tompkins et al., 2018, 2022), less research has been conducted in extrafamilial contexts, such as nursery and preschool environments. Studies in these settings are focused on verbal interaction between an adult education practitioner and either individual children or small groups of children. The empirical work in the present study concerns the latter: conversational interactions between adults and groups of children in preschool.

Few studies have explored how children's ToM and EU can be enhanced through programmes based on language activities with small groups of children in preschool settings. Those that have were primarily conducted within the framework of the conversational hypothesis (Siegal, 1999). Conversations are social phenomena that occur among individuals and have been analysed within various disciplines, including the philosophy of language, sociology, and pragmatics (see Grazzani & Brockmeier, 2019). Seminal work by Grice (1989) established that everyday conversational exchanges are governed by the cooperative principle. Interlocutors need to master four key maxims of conversation: quantity (providing an adequate amount of information), quality (sharing information believed to be true), relation (offering relevant contributions at each stage of the interaction), and manner (expressing oneself clearly and intelligibly). According to the *conversational paradigm* in developmental psychology (Siegal, 1999), young children are drawn into the social world via the conversational interactions of everyday life. Conversation can concern events and material features of the external world, as well as concepts and states of inner worlds that may be explored and explained through discourse. As well documented by Carpendale and Lewis (2021) and Montgomery (2022), during group conversations children are prompted to pay attention to the contributions of others, such as statements, comments, questions, and answers. They are encouraged to adopt others' perspectives and to compare them with their own viewpoints. Engaging in this type of activity helps develop perspective-taking skills, which are essential for navigating the social world. It fosters the recognition that another person may have intentions, perceptions, thoughts, beliefs, emotions, feelings, motives, or information that differ from or align with one's own, as shown in training studies that have exposed children to social discourse (e.g., Giménez-Dasí et al., 2017; Guajardo & Watson, 2002; Pronina et al., 2021; Tenenbaum et al., 2008; Voltmer & von Salisch, 2022).

In the Italian-speaking context in which this study took place, there are relatively few validated programmes designed to promote social understanding in educational settings. Mori and Cigala (2019) conducted a study in which small groups of preschool children received training in perspective-taking. The significant results from this research led to the development of a preschool programme addressing multiple dimensions of perspective-taking, including perceptive and cognitive aspects (Mori & Cigala, 2021). This programme incorporates a wide range of structured activities, integrating language and discourse with movement, drawing, and dramatization. Efforts to promote theory of mind at preschool are aligned with similar initiatives in primary school settings. For example, in the Italian context, Bianco et al. (2019, 2021), demonstrated that conversation about mental states enabled children aged 7 to 8 to outperform peers in a control group

on ToM tasks. These empirical findings contributed to the creation of a validated programme for primary school students (Lecce & Bianco, 2021).

A decade ago, we ourselves began to conduct a series of intevention studies in kindergartens to evaluate the effectiveness of a programme designed to promote social understanding. These studies (e.g., Ornaghi et al., 2011; Grazzani Gavazzi & Ornaghi, 2011; Grazzani & Ornaghi, 2014) focused on preschool children aged 3 to 6, who listened to stories (shared book reading) enriched with mental state lexicon. Following each story, participants engaged in guided language games and conversations designed to elicit mental state language. Compared to the control group, the training group participants displayed significant gains in their ToM and EU. These findings informed the development of a structured programme (PSULG: Promoting Social Understanding through Language Games) based on a *word launching* technique and *language games* targeting mental terms such as 'to think', 'to be afraid', 'to decide', 'to remember'. This programme (Grazzani & Ornaghi, 2022) includes detailed guidelines to assist educators, teachers, education specialists, psychologists, and other practitioners in conducting activities aimed at enhancing children's ToM and EU in small group settings. More details on the techniques used during the training are provided below in the *Intervention Procedure* paragraph of the Method Section. The *Supplementary Materials* section of this article provides a sample text from the storybook used in the Programme, along with instructions for implementing the word launching and language game activities that are central to the programme.

The present study

This study is informed by a socio-constructivist perspective rooted in Vygotskian theory, with the work of Carpendale and Lewis (2021) serving as a key theoretical and empirical reference in this field. These authors argue that our understanding of the social world emerges through interaction with others and the co-construction of meaning based on discourse and active dialogue about internal states.

Building on the background outlined above, we conducted a new training study based on the previously validated Programme, which has been successfully implemented for educational purposes over the years. This study had two main aims: first, to investigate whether the PSULG continued to demonstrate its effectiveness, using more robust assessments than those employed in earlier research (e.g., by including a standardized measure of language ability, specifically receptive vocabulary); and second, to explore, for the first time, its impact on preschoolers' prosocial orientation. To the best of our knowledge, no prior training studies have investigated whether a programme primarily

designed to enhance preschoolers' ToM and EU could also foster their prosocial orientation. We hypothesized that, if the programme had successfully enhanced children's capacity for mentalization and perspective-taking, this, in turn, could have positively influenced their prosocial orientation.

Based on findings from earlier training studies that also relied on a conversational approach (for a review, see Secora & Maples, 2024; Tompkins et al., 2018), we anticipated significant differences between the training group and the control group following the conversational intervention. More specifically, we hypothesized that the experimental group would outperform the control groups not only on measures of language and social understanding (ToM and EU) but also on a measure of prosocial orientation. Indeed, our goal was to investigate whether implementing PSULG could additionally influence children's propensity to engage in positively valued social behaviours.

Research design

Following recommendations by Campbell et al. (2004), we conducted a training study with participants from two different schools. In both schools, two classes were randomly selected and randomly assigned to either a training or control group (in conformity with a cluster randomized trial research design). A member of the research team conducted the intervention which comprised four phases: familiarization (duration one week), pre-test (duration two weeks), training (duration two months beginning 10 days after the pre-test phase), post-test (conducted three months after the pre-test over a two week period). During the two-month training phase, groups of five/six children at a time participated in 16 sessions conducted twice weekly. The children assigned to the training group received training based on the programme, of which an example is provided in the *Supplementary Material* section. Each session began with reading a story, followed by the repetition of a sentence from the text, the word launch technique introducing the story's target word, guided conversation questions, language games, and a final activity (see *Intervention Procedure* below for further details). Participants in the control group took part in the same number of sessions; however, after listening to the same stories, they engaged in drawing, building, and free play activities instead of the conversational training.

Method

Participants

Anticipating a medium effect size based on prior research in this domain, and using G*Power software, we set the desired power level *a priori* at 0.70. The analysis indicated that a minimum of 30 participants per group condition would be required to obtain 95% statistical power in detecting the expected effect. The participants in this study were 61 children (35 girls, 57%; mean age at the beginning of the study = 54 months, *range* = 38–71 months; *SD* = 9.8). Evenly divided into two groups (a training – n = 30 – and a control group), children were enrolled for each experimental condition at each of two nursery schools, in an urban area of a Northern Italian region. All participants in the study were native Italian speakers; five were bilingual and had been born in Italy. The inclusion criteria were as follows: (1) children had to be between 40 and 71 months old at the commencement of the study, meaning they were under the age of 6; (2) children were required to display typical language development as assessed using a measure of receptive vocabulary. More specifically, to be included in the study, children were required to score above the tenth percentile on the standardized language assessment tool, ensuring that their command of Italian was sufficient to perform the tasks. Children excluded based on this criterion, or whose parents did not provide informed consent, continued to participate in regular classroom activities alongside their peers. Additionally, they took part in six alternative sessions – distinct from the research intervention – involving story reading and language play. These activities were distributed across the duration of the study.

The parents were of medium socioeconomic status. The majority held either a high school diploma or a bachelor's degree (85% of mothers and 82% of fathers). Seventy percent of mothers and 52% of fathers were employed in white-collar occupations. The remaining parents were either manual workers or self-employed professionals. At the beginning of the study, 8% of mothers and 2% of fathers were unemployed. The parents attended a presentation describing the study and subsequently provided written informed consent for their children's participation. Participants were free to withdraw from the study at any time.

Measures

Participants individually completed the following validated instruments – administered in counterbalanced order – in a quiet and familiar room at their nursery school. Both at pre- and post-test, these

measures were presented by a member of the research team who had previously spent familiarization time getting to know the children. Familiarization lasted one week, during which two members of the research team (one in charge of testing and one in charge of the training) visited the school for five consecutive days, spending either the morning or the afternoon actively participating in educational and play activities. The children were informed that the team members were undergoing professional training to learn how to work in a preschool setting.

*Peabody picture vocabulary test (PPVT, Dunn & Dunn, **2007**)*

We used the Italian standardized version (Stella et al., 2000), which evaluates the receptive vocabulary of children between 3 and 12 years using a pack of 180 cards. Each card displays four numbered illustrations, and the child is asked to indicate the illustration that corresponds to the word spoken by the examiner. Scoring was based on the standard procedure, with 1 point awarded for each correct answer and 0 for each wrong answer. The reliability coefficient was Cronbach's $\alpha = .70$.

ToM battery

This measure comprised two first-order false-belief tests: a) a 'false-belief location change task' consisting in the Italian adaptation of the classic 'Sally and Anne' story (Liverta Sempio et al., 2005); b) a false-belief unexpected content task consisting in the Italian adaptation by Liverta Sempio et al. (2005). For each task, children were awarded scores of 1 for the correct answer and 0 for a wrong answer. Scores for the battery were summed to yield a possible maximum total score of 2. The reliability coefficient was Cronbach's $\alpha = .80$.

Test of emotion comprehension

The TEC devised by Pons and Harris (2000) assesses EU in 3- to 11-year-olds. It encompasses nine components (Pons et al., 2004), namely: the recognition of facial expressions of emotions; the understanding of, respectively, the impact of situational causes on emotions, the role of desires in emotions, the role of beliefs in emotions, the impact of memories on emotions, the distinction between outwardly expressed and privately felt emotions, and the effect of morality on emotions; the awareness that emotions may be regulated using cognitive control strategies; and, finally, an appreciation of concurrent mixed feelings. In the current study, we deployed the standardized Italian version (Albanese & Molina, 2008). The TEC assesses EU by presenting vignettes in which a gender-matched protagonist encounters simple to complex situations eliciting different emotional responses. After each vignette, the child is asked to indicate how the protagonist feels, by choosing among four

illustrations of faces representing different emotional states. For each group of items testing an individual component, a score ranging from 0 to 1 is awarded. These scores are then summed to obtain a Total TEC score, which ranges from 0 to 9. In this study, the scoring system was applied in strict accordance with the guidelines of Pons and Harris (2000). The reliability coefficient was Cronbach's $\alpha = .73$.

The prosocial orientation story-completion task

(Ornaghi et al., 2015). The POST, fully described in Ornaghi et al. (2015) and Grazzani & Ornaghi (2015), consists of four illustrated scenarios, presented in counterbalanced order, describing familiar situations encountered by a child (a boy or a girl for gender-matching purposes), followed by a question assessing the respondent's prosocial orientation. The four items focus on specific prosocial behaviours: comforting, peace-making, sharing, and helping. The adult reads the story and, after a control question testing the child's comprehension of the story ('What happened here?'), asks her to say how it ends. Participants' responses were audiotaped and transcribed. A score of 0, 0.5, or 1 was awarded for each item, yielding a maximum possible score of 4. Two judges from our research laboratory, blind to participants' group membership, independently coded participants' responses, attaining a satisfactory level of inter-rater reliability (Krippendorff's $\alpha = .82$).

The intervention procedure

Between the pre- and post-tests, a two-month intervention took place. Children assigned to the training condition, in groups of five to six at a time, took part in twice-weekly intervention sessions lasting around 20 minutes each and implemented in a quiet room of the school building. Composition of the working groups was on the basis of teacher nomination; all groups were mixed gender and made up of children of the same age. In previous studies, the group size for the individual training sessions was found to be adequate for promoting children's attention and participation (e.g., Ornaghi et al., 2011, 2015). Children who were unable to attend a session made it up by joining a subsequent session with a different group.

The training was conducted by a highly experienced member of our research laboratory. Given that the teachers at the school were not ready to implement the activities during the study, they received supervised training in programme delivery over the following academic year.

During the training sessions, participants listened to stories enriched with mental state language and then took part in language games. In contrast, after listening to the same story, the children in the control groups were allowed to engage in free play and were provided with toys and construction

games, deliberately selected to minimize conversation amongst the participants.

The stories were presented in an illustrated story book entitled '*The Adventures of Jack and Theo*', specifically developed for the programme (Grazzani & Ornaghi, 2022). The sixteen stories followed the adventures of two recurring protagonists – Jack, a dolphin, and Theo, a shark – who face challenges and find creative solutions. The texts were richly infused with mental state language, and their sequence was carefully structured to reflect the increasing complexity and developmental order of the target mental state terms. In particular, eight mental state terms were used: *getting scared, getting angry, wanting, remembering, knowing, thinking, believing*, and *deciding*. Each target word was presented twice, in two different stories read at two different training sessions.

Following a standard procedure, during the activity the trainer repeated a sentence from the story which had just been read, containing the target term to be focused on in conversation during the training session. In this way, children were allowed to relate the activity to content that they had just heard and so to contextualize the language game. Following the word launch (Ciceri, 2001), the children were then invited to participate in a conversation. The trainer explained to the children that the language game consisted of using the selected term: 'In the sentence I have just read to you, there is the word *afraid*. Now we are going to play with this word; so, the game consists of using the word *afraid*. Remember you have to use it. So, if I say I am *afraid* what does it remind you of? Remember, you have to use this word when you speak, for example with expressions like *I am afraid that* . . . or *when I am afraid* . . . '. During the conversation, the adult stimulated the children to use the target word as much as possible by means of focused questions or comments suggested in the programme guidelines. In addition, he/she strove to involve all the participants in the conversation. After about 20 minutes of conversation, the trainer wound up the session. The aim of the training session was to give all the children the opportunity to actively use the target mental state term. [1]

[1]Drawing on the philosophical concept developed by Wittgenstein (1953), the term 'language game' is understood here as playing with the socially determined uses of a word that collectively constitute its meaning. During the training sessions, each verb representing a category of mental state language served as the target term of a language game, introduced using the word launching technique (Ciceri, 2001). The language game involved actively encouraging each child in the group to use the target word (e.g., *remember*) in a spontaneous and meaningful way. Stimulus questions were used to prompt discussion and invite comparisons between the children's different perspectives. Rooted in the content of the story just read, this activity highlighted the children's physiological states, desires, thoughts, and emotions – sometimes shared, sometimes diverse. As understood by Wittgenstein, playing with words emphasizes their pragmatic use, which includes both the intention behind statements and their communicative function. Furthermore, by using a term within a conversational exchange, a child not only appropriates its meaning but also internalizes it, enabling genuine use in future interactions.

Data analyses

We conducted all data analyses using IBM SPSS Version 29 software. Preliminary testing of the data suggested that scores on the study variables were generally normally distributed, with skewness and kurtosis values falling within the accepted range of ±2 (George & Mallery, 2010). Before analysing the efficacy of the training, we performed standard data-cleaning procedures including identification of missing values (2) and uni-multivariate outliers (3). The final sample ($N = 61$) included only children who had participated in all the training sessions and had scores for both testing phases. Following statistical procedures appropriate for the research design (Izenman, 2008), we first computed descriptive statistics and zero-order correlations (Pearson's r). To assess baseline equivalence between the two groups, a series of ANOVAs were conducted on pre-test scores. Subsequently, to evaluate the impact of the training activities, we performed a repeated-measures multivariate analysis of variance (MANOVA), controlling for age. The independent variables were Time (pre-test vs. post-test) and Group Condition (training vs control). Time was a within-participant variable whereas Group Condition was a between-participant variable. The dependent variables at both time points were language ability, theory of mind, emotion understanding, and prosocial orientation. Effect sizes were calculated using partial eta-squared (η_p^2) values.

Results

This section is divided into two subsections: the first outlines descriptive statistics for all study measures as well as the correlational matrix describing how the variables under study are related to one other; the second subsection details the impact of the training on children's language ability (receptive vocabulary), theory of mind, emotion understanding, and prosocial orientation.

Table 1. Means and standard deviations of all variables before and after the intervention phase ($N = 61$).

	MEAN (pre and post)	*SD* (pre and post)
AGE in months	54.03–57.37	9.8–10.01
LANGUGE ABILITY *PPVT*	59.3–67.51	25.4–26.4
EMOTION UNDERSTANDING *TEC*	4.79–5.44	1.60–1.7
THEORY OF MIND *FB Battery*	.79–1.11	.83–.84
PROSOCIAL ORIENTATION *POST*	2.02–2.16	1.61–1.60

Descriptive statistics

Table 1 presents the descriptive statistics ($N = 61$) at pre-test and post-test for all the variables under study. These include the means and standard deviations, both before and after the intervention phase, for the following: participants' age in months, language ability – specifically, receptive vocabulary – as assessed by the Peabody Test, theory of mind as assessed via the ToM Battery (change of location' and 'unexpected content tasks'), emotion understanding as evaluated by the TEC, and prosocial orientation as assessed by POST.

We also conducted correlational analysis on the pre-test data. Age in months was significantly positively associated with global language ability ($r = .667$, $p < 0.001$), theory of mind ($r = .541$, $p < 0.001$), emotion understanding ($r = .650$, $p < 0.001$), and prosocial orientation ($r = .685$, $p < 0.001$). Language ability was significantly positively associated with emotion understanding ($r = .470$, $p < 0.001$), theory of mind ($r = .642$, $p < 0.001$), and prosocial orientation ($r = .534$, $p < 0.001$). Theory of mind was significantly positively associated with emotion understanding ($r = .601$, $p < 0.001$) and moderately associated with prosocial orientation ($r = .292$, $p = 0.02$). Gender was not correlated with any variables under study, so it was excluded from subsequent analyses.

The effectiveness of the training

At pre-test, the training and control groups did not differ significantly in relation to age ($p = .572$), language ability ($p = .547$), theory of mind ($p = .906$), and prosocial orientation ($p = .281$). The two groups showed a significant difference in emotion understanding ($F = 5.05$, $df = 1$, $p = .028$) with the control group showing an higher mean than the training group.

To test the impact of the training activities, we conducted a multivariate analysis of variance for repeated measures (MANOVA), while controlling for age. It should be noted that Time was a within-participant variable whereas Group Condition was a between-participant variable. The dependent variables were language ability, theory of mind (Total ToM Battery), emotion understanding (Global TEC score), and prosocial orientation.

We observed a significant Time ×Group Condition interaction for language ability, Wilks's $\lambda = .939$, $F = 3.9$, $p = .05$, $\eta_p^2 = .061$, and for emotion understanding (Total TEC), Wilks's $\lambda = .712$, $F = 23.9$, $p = <.001$, $\eta_p^2 = .288$. In addition, a detailed analysis of the individual TEC components showed a significant Time ×Group Condition interaction for Component 1 (recognition of facial expression of emotions), Wilks's $\lambda = .914$, $F = 5.58$, $p = .02$, $\eta_p^2 = .086$, Component 4 (the role of beliefs on emotions), Wilks's $\lambda = .911$,

Table 2. Pre- and post-test means and standard deviations for all variables by group condition.

	CONTROL GROUP ($n = 31$)			TRAINING GROUP ($n = 30$)		
	PRE-TEST	POST-TEST	Gain	PRE-TEST	POST-TEST	Gain
AGE in months	54.77 (10.2)	57.97 (10.5)	/	53.32 (9.6)	56.77 (9.9)	/
LANGUAGE ABILITY *PPVT*	56.90 (25.7)	62.23 (28.3)	5.33	61.74 (25.3)	72.61 (23.8)	10.87
EMOTION UNDERSTANDING *TEC*	5.27 (1.4)	5.33 (1.7)	0.06	4.32 (1.8)	5.84 (1.7)	1.52
THEORY OF MIND *FB BATTERY*	.80 (.76)	.97 (.80)	0.17	.77 (.92)	1.26 (.85)	0.49
PROSOCIAL ORIENTATION *POST*	2.25 (1.6)	2.15 (1.7)	− 0.1	1.8 (1.5)	2.2 (1.7)	0.4

Standard deviations are in parentheses. For each task, the table also presents the gains from pre- to post-test in both the control and the training group.

$F = 5.79$, $p = .019$, $\eta_p^2 = .089$, and Component 5 (the impact of memories on emotions), Wilks's $\lambda = .875$, $F = 8.42$, $p = .005$, $\eta_p^2 = .125$.

We then broke down the Time ×Group Condition interaction for the Total TEC and the language scores into the simple main effects. At post-test, there were statistically significant differences between groups regarding language ability, $F = 4.0$, $p = .05$, $\eta_p^2 = .061$, and emotion understanding (Total TEC), $F = 5.05$, $p = .02$, $\eta_p^2 = .079$. Specifically, the children in the training group obtained higher scores on these measures than the children in the control group.

Moreover, we found a trend towards significance in the Time × Group Condition interaction for ToM (global score), Wilks's $\lambda = .951$, $F = 3.02$, $p = .08$, $\eta_p^2 = .049$, and for prosocial orientation, Wilks's $\lambda = .953$, $F = 2{,}85$, $p = .09$. $\eta_p^2 = .047$. Age did not interact significantly with any of the variables under study.

Table 2 provides the means and standard deviations at pre-test and post-test for each Group Condition (control vs training), along with the gains from pre-to post-test for both conditions. On every measure, the mean gain was higher in the training group than in the control group: language (10.87 vs 5.33), theory of mind (0.49 vs 0.17), emotion understanding (1.52 vs 0.06), and prosocial orientation (0.4 vs −0.1).

With respect to the Time factor (the within-participant variable), the MANOVA showed that Time had a significant effect on language ability, Wilks's $\lambda = .642$, $F = 32.84$, $p < .001$, $\eta_p^2 = .358$, theory of mind, Wilks's $\lambda = .823$, $F = 12.72$, $p < .001$, $\eta_p^2 = .177$, and emotion understanding, Wilks's $\lambda = .821$, $F = 12.85$, $p < .001$, $\eta_p^2 = .179$. However, time was not significant for prosocial orientation, Wilks's $\lambda = .985$, $F = .906$, $p = .345$, $\eta_p^2 = .015$. Considering Group condition, for the control group a significant pre-to post-test increase was found only for language ability, $t(29) = 2.9$, $p = .006$. In contrast, the

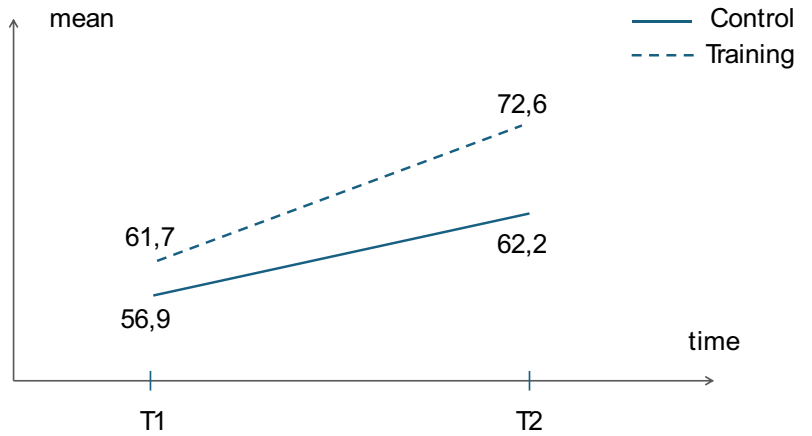

Figure 1. Control and training groups scores on language ability at pre (T1) and post-test (T2).

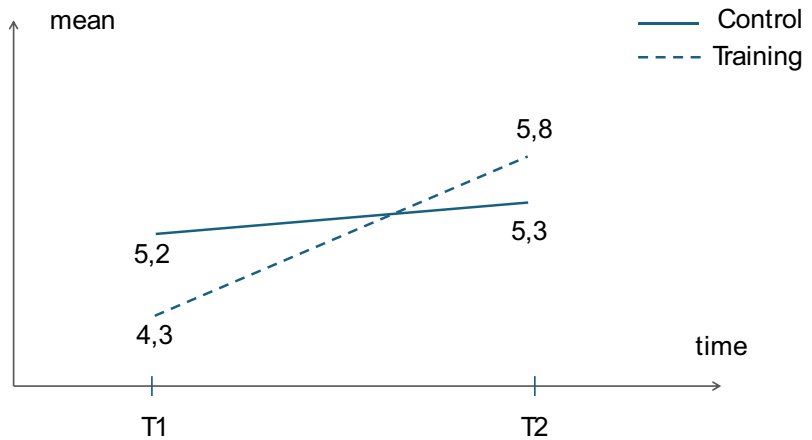

Figure 2. Control and training groups' scores on emotion understanding at pre-test (T1) and post-test (T2).

training group displayed significant pre-to post-test increases for language ability, $t(30) = 5.0$, $p = <.001$, theory of mind, $t(30) = 3.98$, $p = <.001$, emotion understanding, $t(30) = 5.1$, $p = <.001$, and prosocial orientation, $t(30) = 2.2$, $p = .03$. Figures 1 and Figure 2 illustrate the significantly greater improvement of the training group – as compared to the control group – from pre-test to post-test on the language ability measure and the global TEC measure, respectively.

Given the significant interaction between Time and Group Condition for emotion understanding, we conducted a follow-up analysis to examine

whether changes in language ability accounted for the observed group differences in TEC score improvements from pre- to post-test. A repeated-measures analysis of covariance, using gains in PPVT scores as a covariate, revealed that changes in receptive vocabulary did not explain the group differences, which remained statistically significant, Wilks's $\lambda = .811$, $F = 11.85$, $p < .002$, $\eta_p^2 = .169$.

Discussion

This study was built on previous research aimed at validating a programme (PSULG) to be implemented in preschool contexts in order to enhance preschoolers' ToM and EU. In the present study, we set ourselves two main objectives. The first was to confirm the results obtained in previous studies by administering rigorously standardized and validated Italian-language instruments, for example a more psychometrically robust language test. A second objective was to explore for the first time the impact of training not only on theory of mind and emotion understanding, as in previous studies, but also on prosocial orientation.

The first key finding from this study pertained to the impact of the training on language ability and emotion understanding, after controlling for the effects of age. This result aligned with those from previous studies (Ornaghi et al., 2011; Grazzani Gavazzi & Ornaghi, 2011), further supporting the effectiveness of the PSULG in enhancing children's social understanding. Not surprisingly given the conversational nature of the training, children who participated in language games outperformed the control group on the language ability measure at post-test. The active use of language in conversational exchanges – rich in questions, answers, statements, and comments – appeared to have enhanced the linguistic abilities of participants in the training group compared to those in the control group.

With regard to the training effect on emotion understanding, the results showed a significant gain for the experimental group, despite their lower mean scores at the pre-test compared to the control group. The multivariate analysis clearly demonstrated the impact of the programme on children's post-test performance, with a medium effect size supporting this outcome. Notably, the significant effect on the overall emotion understanding (EU) score was independent of improvements in receptive vocabulary. This supports the hypothesis that conversational training primarily enhances children's ability to reflect on their own and others' internal states. This interpretation is further reinforced by the particularly significant gains observed in Components 4 and 5 of the TEC, which assess children's understanding of the mentalistic aspects of emotions, such as the influence of beliefs and memories.

In contrast, the impact on theory of mind was not statistically significant, partially in line with the findings in Ornaghi et al. (2011). Nevertheless, the improvement in false belief comprehension showed a trend towards statistical significance, which was supported by comparing the pre- and post-test gains across the two groups (see Table 2), with the training group showing a clear advantage. It is plausible that the TEC, a highly reliable tool even for the younger children in our sample, was more effective than the false belief task battery in detecting differences between the pre- and post-test performances of training versus control participants. Future research could explore whether a more intensive training schedule – for example, three sessions per week – might yield stronger effects, particularly when stories enriched with mental state language are followed by targeted language games. It would also be valuable to include a pre-post measure specifically designed to assess gains in children's mental state language.

A second key finding relates to the impact of the training on prosocial orientation, an aspect that was explored innovatively in this study. Interestingly, we found no effect of the Time variable on children's performance in prosocial orientation along with a trend towards statistical significance in the Time × Group interaction. As highlighted by studies on prosocial behaviour in childhood (Dunfield, 2014; Malti, 2023), children as young as three to four years old already display prosocial behaviours such as helping, sharing, informing, and comforting. In line with these findings – and with the socio-constructivist perspective that informs this study – we argue that socialization processes beginning in preschool can be particularly influential in shaping a prosocial orientation that continues to develop in later years. The results of this study – even if we found only a trend towards statistical significance in the Time × Group interaction – suggest that such training may contribute to fostering children's inclination towards socially positive behaviours. From an applied perspective, this outcome is particularly promising if we consider that it was achieved with just two months' intervention, and an intervention that did not primarily target prosociality. Other studies have similarly emphasized the role of social cognition, particularly emotion understanding (EU), as a predictor or mediator of children's prosocial orientation (Brazzelli et al., 2022; Eggum et al., 2011; Ensor et al., 2011; Ornaghi et al., 2016). In line with these studies, our findings show that an improvement in one aspect of social understanding (e.g., EU) can also foster children's propensity to engage in positive social behaviours. In future studies, the inclusion of additional measures of prosocial orientation – such as tasks, standardized tests, or observations of spontaneous behaviour – could provide a more comprehensive understanding of the programme's impact on children's prosocial development.

Overall, the results of this study provide further support for the conversational hypothesis that underpins the intervention proposed in the PSULG,

whose hallmark characteristic is what we have termed language games. The training intervention, centred on the launching of mentalistic terms and subsequent language games, was designed to foster rich conversational exchanges between an adult and a group of children, as well as among the children themselves. Its aim was to actively engage participants in discussions about inner states, encouraging the use of a varied mental state lexicon, encompassing emotional, cognitive, and volitional terms. Through these language-based interactions, the children developed a keener awareness of how thoughts and emotions can drive actions and, conversely, how actions can evoke emotions and thoughts. The language games prompted the children to reflect on their own and others' internal states (see *Supplementary Material*), progressively enabling them to speak more about themselves and others rather than limiting their discussions to the characters in the stories. The children were also encouraged to contribute to the conversational exchanges in an original and non-imitative manner.

Limitations and future research

This study has some limitations that should be acknowledged. First, additional data are required to investigate whether the trends towards significance observed in some results would persist or change with a larger sample size. Second, broader studies are needed to explore variables not addressed in the present research. These include participants' socio-economic status, alternative control group activities (e.g., drama-based interventions), and cognitive factors such as working memory and executive functions, which have been shown to be closely linked to theory of mind throughout childhood (Wade et al., 2018). Third, a limitation of this study is the absence of a follow-up assessment, which would provide valuable information on the long-term maintenance of the training effects. Fourth, it would be beneficial to include a more comprehensive evaluation of linguistic abilities, extending beyond receptive vocabulary to also assess productive vocabulary, syntactic skills, and pragmatic competence. Finally, in light of recent theoretical advances regarding adult-child conversations about mental states (Farrell et al., 2023; Tompkins et al., 2022) further investigations are required to refine the methods of this programme and thus optimize its impact. In this regard, it would be valuable to conduct a more in-depth examination of both the nature of the children's contributions during the conversational exchanges based on language games and the linguistic style employed by the adults. Insights gained from such investigations could inform the training of teachers tasked with implementing this programme. Despite these limitations, PSULG could be of value for children who display underdeveloped abilities in the field of social understanding or for children with delayed language development, including those from immigrant backgrounds or with atypical

developmental profiles. An additional promising line of future research could involve implementing the programme in other European and non-European contexts to assess its effectiveness across diverse educational and pedagogical systems.

Conclusion

We wish to conclude by highlighting an important implication of this study: for the programme to be effectively understood and implemented by preschool teachers, it is essential that they are equipped with both a solid grasp of its conceptual foundations and the practical skills required for its delivery. Training teachers in shared book reading, word launching, language games, and conversations about inner states provides them with a powerful pedagogical tool. Through guided discussions with trained educators, children can progressively learn to identify the mental states of story characters, recognize their own internal experiences, and distinguish their emotions, thoughts, feelings, and intentions from those of others. Ultimately, by 'playing with words' children can enhance their own social understanding and prosocial behaviour.

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethics statement

This research was conducted in line with the Declaration of Helsinki principles and in conformity with the recommendations of the University of Milano-Bicocca Ethics Committee (protocol code: 44281/20). Written informed consent to participate in this study was provided by the participants' legal guardians/next of kin.

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