



Mind the dog: real dogs elicit emotional and mental state language in parent-child conversations

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ABSTRACT

Growing up with a pet, especially a dog, can play a significant and emotionally meaningful role in a child's life. Living with a pet is related to a range of positive social-emotional outcomes, such as increased empathy and prosocial behavior, but the mechanisms underlying these relations are not well understood. One potential pathway by which pets might encourage the development of empathy is through the use of emotional and mental state (EMST) language during conversations about pets. In this experiment, 184 children (108 females; 36–72 months) and their primary caregivers (176 mothers, 6 fathers, 2 others) who currently lived with a dog ($n = 91$) or have never lived with a dog or cat ($n = 93$) were randomly assigned to read a wordless picture book depicting either a real dog or a lifelike toy dog. Conversations were transcribed and coded for EMST language. Our results show that both parents and children produced higher proportions of EMST language when viewing and discussing a real dog versus a toy dog, regardless of pet ownership. These findings provide some of the first experimental evidence that a single brief exposure to a representation of a real dog encourages greater use of EMST language in parent-child interactions—language that is associated with children's positive social-emotional development.

Introduction

Pets, and dogs in particular, occupy a central and meaningful place in many children's lives. Previous research has shown that living with a pet dog has been associated with a range of positive social and emotional outcomes (McNicholas & Collis, 2001; Melson, 2020; Purewal et al., 2017). For example, children who live with dogs tend to display higher social competence, fewer behavioral problems, and greater prosocial behavior than children without dogs (Christian et al., 2020; Dueñas et al., 2021). Regular interactions with dogs, such as walking or playing with them, have also been linked to better emotion regulation and peer relationships (Wenden et al., 2021). Compared to children without pets, children with dogs report lower anxiety, improved emotional expression, and show lower risk of developmental delays in communication, gross motor, fine motor, problem-solving, and personal-social domains (Gadomski et al., 2015; Minatoya et al., 2021). Similar benefits have been observed in school settings, where the presence of dogs has been shown to increase social cohesion, reduce aggression and hyperactivity, and promote enthusiasm and engagement in classroom

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activities (Baird et al., 2023; Kotrschal & Ortbauer, 2003; Tissen et al., 2007). Although this literature is still developing, several of these associations have been documented across different countries (e.g., Australia, Christian et al., 2020; Japan, Minatoya et al., 2021; the United States, Gadowski et al., 2015) and across childhood; a number of these associations remain even after adjusting for common demographic variables such as household income and parental education (Christian et al., 2020; Minatoya et al., 2021).

One particularly important outcome related to children's interactions with dogs is prosocial development. Prosocial development encompasses a range of voluntary other-oriented actions, such as helping, comforting, and sharing with others. Empathy is a central component of prosocial development and includes both an understanding of others' emotions or perspective taking (e.g. cognitive empathy), as well as the ability to feel and share the emotions of others (affective empathy; Cuff et al., 2014; Jolliffe & Farrington, 2006). While empathy is driven by cognitive and affective processes, prosocial behaviors reflect the ways in which these capacities are expressed behaviorally in social contexts (Belacchi & Farina, 2012; Eisenberg et al., 2006; Eisenberg et al., 2015; Strayer, 1987; van Noorden et al., 2015). Both empathy and prosocial behaviors emerge gradually across early childhood, with early precursors such as gaze following and sensitivity to others' distress appearing in infancy and becoming increasingly complex over time (Eisenberg et al., 2006; Geangu et al., 2010; Sagi & Hoffman, 1976; Vaish et al., 2009). Children's use of mental-state language is also shaped by their developing understanding of agency—when, and to which entities, children attribute goals, beliefs, and other mental states—which emerges early and continues to develop across infancy and the preschool years (Baillargeon et al., 2016; Paulus, et al., 2022; Scott, et al., 2022; Yu & Wellman, 2022).

Importantly, a growing body of research points to a link between living with a pet dog and children's empathic development. Children who own dogs exhibit greater empathy than those who own cats or no pets (Daly & Morton, 2003), and likewise, adults who lived with dogs in childhood report higher empathy in adulthood (Daly & Morton, 2009; Vizek-Vidović et al., 2001). Although there is little experimental research examining the role of dog ownership in the development of children's empathy, one study reported that after introducing a classroom dog for three months, first grade children showed increased empathy toward animals, more positive social interactions, and reduced aggression (Hergovich et al., 2002). Thus, this work suggests that children's interactions with dogs may provide early opportunities for empathic growth. Notably, dogs themselves display human-like prosocial tendencies; in a recent comparative study, dogs and toddlers showed similar levels of spontaneous helping behavior in a naturalistic problem situation, whereas cats did so far less often (Csepregi et al., 2026), suggesting that dogs may also provide young children with salient models of other-oriented behavior.

Despite strong evidence that dog ownership can promote positive socioemotional outcomes like increased empathy, less is known about the *mechanisms* through which dog ownership brings about these effects. One possibility that has been recently suggested in the literature is that dogs elicit the use of emotional and mental state (EMST) language in parent–child interactions (Reider et al., 2023). EMST language refers to language about emotions, desires, thoughts, and other internal states (Drummond et al., 2014). Prior work shows that EMST language is positively associated with children's empathy and prosociality (Brownell et al., 2013; Ruffman et al., 2002; Taumoepeau & Ruffman, 2008). Further, longitudinal work shows that early emotion understanding predicts later prosocial behavior (Ensor et al., 2011), and a conversation-based intervention that increased toddlers' use of mental- and emotion-state language produced gains in emotion understanding and prosocial behavior (Grazzani et al., 2016). In a recent study, Reider and colleagues (2023) confirmed that parents use more emotional and mental state language when interacting with their child and a pet dog compared to a lifelike toy. In these interactions, parents frequently referenced the dog's feelings, wants, and needs, likely because dogs are unable to verbally convey their own internal states. Given the causal link between EMST language and empathy development, identifying contexts that promote more EMST language in parent–child conversations is important. Pet ownership might be one such context, representing a plausible mechanism through which dogs may support children's empathy development.

Indeed, because pets are living, animate beings that cannot verbalize their own thoughts, needs, and desires, their internal states must be inferred and narrated by the people around them (Reider et al., 2023). Conversations about a pet can therefore serve as a natural context for talking about emotions and mental states: Even mundane, everyday talk about how a dog is feeling, what it wants, or why it behaves as it does invites perspective taking and EMST language precisely because the dog cannot supply this information itself. Following this logic, parental EMST language is the primary input—caregivers who label and elicit talk about internal states scaffold the child's developing emotion understanding and theory of mind during the infancy and preschool years, when these skills are first emerging (Brownell et al., 2013; Drummond et al., 2014). Children's own EMST language plays a complementary role, reflecting and consolidating this developing understanding as children practice attributing internal states in conversation. Over repeated interactions, this parent-led, child-supported talk might help children apply emotion and mental state concepts towards others—both animal and human—who need compassion and support, thereby fostering empathy and prosocial behavior. Given that parents structure these conversations, the present study treats parental EMST language as the primary outcome and children's EMST language as a secondary, exploratory outcome.

To date, nearly all existing research on the link between pets and empathy is correlational, with little data exploring the potential mechanisms underlying the role of pets on children's emotional development. While EMST language appears to be more frequent in the presence of a pet dog than in other contexts, it remains unclear whether parents who live with a pet dog naturally use more EMST, or whether *any* interaction involving a live dog (however brief) by *any* parent (regardless of pet ownership) *elicits* the use of more EMST language during parent–child conversations. Here, we build on previous work by experimentally manipulating the presence or absence of a real dog in an informal storybook interaction. Preschool-aged children and their parents were invited to read a wordless storybook about dogs. Half of the dyads were randomly assigned to read a book featuring images of a real dog, and the other half were randomly assigned to read the same book featuring images of a toy dog. Importantly, half of the families in each condition lived with a real dog at home, while the other half did not. Our primary question was whether reading a book about a real dog would elicit more EMST language in children and their caregivers than an identical book featuring a toy dog, and whether the use of EMST language differed by

pet ownership. Our secondary question was whether reading a storybook about a real vs. toy dog would lead to differences in various measures of children's empathy. The results of this work will tell us whether dogs serve as a natural context for eliciting EMST language, which may in turn contribute to children's empathy and prosocial development. We focus primarily on parents' EMST language, given that caregivers structure these conversations, and we additionally code and examine children's EMST language as a secondary, exploratory outcome.

Methods

Transparency and openness

We preregistered the study design, sample size, and primary analyses on [aspredicted.org](https://aspredicted.org/100627) (100627; <https://aspredicted.org/nk5gj8.pdf>). Data were analyzed using SPSS Version 29 (IBM® SPSS® Statistics: IBM Corp. Released, 2023). All data and stimuli are available on Databrary (<https://databrary.org/volume/1905>).

Participants

Families completed an online eligibility form to participate in the current study. To be eligible for participation, families must have endorsed having a child between 36 and 72 months of age, and they must either currently live with a pet dog (pet dog group) or have never lived with a pet dog or cat (as cats are commonly owned pets and provide comparable forms of interaction) (no dog group) at the time of enrollment in the study. Families who have never lived with a pet dog or cat but have lived with other kinds of animals (e.g., lizards, hamsters, fish) were placed in the no dog group (see Reider et al., 2023 for rationale).

Participants were 184 children (108 females, 76 males) and their primary caregivers (176 mothers, 6 fathers, 2 others) half of whom currently lived with a dog and the other half who did not. Of those who currently lived with a pet dog ($n = 91$), 61 (67 %) only lived with a pet dog, 9 (9.9 %) had a dog and a cat, 8 (8.8 %) had a dog and another pet, and 13 (14.3 %) had a dog, a cat, and another pet. Of those who reported having no dog or cat (no dog group, $n = 93$), 82 families (88.2 %) did not have any pets, and 11 families (11.8 %) reported living with other kinds of pets (birds, fish, hamster, lizard, rabbit, snake). Children ranged in age from 36 months to 72 months ($M = 54.93$, $SD = 10.22$) at the time of the study. Children in the real dog condition ($M = 54.95$, $SD = 10.53$) and toy dog condition ($M = 54.91$, $SD = 9.95$) did not differ in age, $F(1, 180) = 0.001$, $p = .976$, $\eta^2 < .001$, nor did children with ($M = 55.43$, $SD = 10.14$) and without ($M = 54.42$, $SD = 10.33$) pet dogs ($F(1, 180) = 0.44$, $p = .508$, $\eta^2 = .002$). The age ranges in the current study were chosen for their developmental significance, as prior research indicates that key advancements in theory of mind—which refers to the ability to attribute mental states to oneself and others—typically emerge between ages 3 and 5 (Wellman et al., 2001).

Parents reported their child's race/ethnicity as White, not Hispanic ($n = 118$, 64.1 %), Asian/Pacific Islander ($n = 18$, 9.8 %), Hispanic ($n = 10$, 5.4 %), Black/African American ($n = 2$, 1.1 %), South Asian/Indian ($n = 8$, 4.3 %), American Indian/Alaska Native ($n = 2$, 1.1 %), other ($n = 2$, 1.1 %), or more than one race ($n = 24$, 13 %). All parents reported that their children had at least one sibling ($n = 184$, 100 %). The majority of children only heard English in the home ($n = 146$, 79.3 %). Parents reported having an advanced degree ($n = 110$, 59.8 %), an AA or BA degree ($n = 56$, 30.4 %), some college or trade school ($n = 17$, 9.2 %), or some high school or a GED ($n = 1$, 0.5 %). Parents also reported their average household income in the last three years (in U.S. dollars) of less than \$20,000 ($n = 2$, 1.1 %), \$20,000–\$39,999 ($n = 7$, 3.8 %), \$40,000–\$59,999 ($n = 10$, 5.4 %), \$60,000–\$100,000 ($n = 62$, 33.7 %), or more than \$100,000 ($n = 96$, 52.2 %). Seven parents (3.8 %) did not report their household income. All sessions were conducted in English, and all questionnaires were completed in English. Families were eligible to participate if the parent and child could communicate with one another in English; we did not require English to be the primary language of the home.

Procedures

Families were recruited via advertisements on our lab website, childrenhelpingscience.com, and through social media platforms. All data were collected online using Zoom. All procedures were approved by the Institutional Review Board at Rutgers University-Newark. Informed consent was obtained at the start of each call. Parents and children in the no dog group and pet dog group were



Fig. 1. Examples of picture book conditions.

randomly assigned to read a wordless picture book about a real dog or a toy dog. Children then completed a prosocial vignette task followed by an emotional perspective taking task. Parents completed questionnaires assessing both their own and their child's empathic and prosocial behaviors, along with demographic information. At the conclusion of the session, participants were debriefed about the purpose of the study. All participants received a \$10 gift card as compensation for their time.

Measures

Picture Book. Parent-child dyads were randomly assigned to read a wordless picture book about a real or a toy dog. The wordless picture book was presented digitally on the parent's computer screen. The book featured 20 images of the real/toy dog in various everyday settings (e.g., sleeping, eating, playing, etc.) (see Fig. 1). Parents were instructed to say something about each page of the picture book but were otherwise free to spend as much or as little time on each page as they normally would when reading with their child. During the picture book phase, the researcher was not visible to the parent and child. The conversations were recorded for offline transcription and coding of EMST language, and the use of pronouns and names of the target (real dog vs toy dog) by speaker (parent vs child) (see "Coding Conversations" section).

Prosocial Vignette Task. Children's prosocial behavior was assessed through responses to four prosocial dilemma vignettes, presented alongside interview-style questions adapted from prior research with children aged 3 to 13 (Reider et al., 2023; Weller & Hansen Lagattuta, 2013). This included two prosocial vignettes in which an unfamiliar child needs help (e.g., fell off a bike and is hurt, drawing and trading cards blew out of a backpack), and two prosocial vignettes in which an unfamiliar child wants to play with the main character's new toy (e.g., new kite, video game). Vignettes were presented via pre-recorded videos, with the same speaker describing each vignette. The four vignettes were presented in a single fixed order, and after each video the experimenter asked the comprehension and response questions live. Each vignette involved a character either currently engaged or about to engage in a fun activity when the character is met by an unfamiliar, same-aged, same-sex child who needs help or wants to play with something fun owned by the focal character. Following each vignette, children were asked two comprehension questions about each character in the vignette to ensure that the child was paying attention and understood each story (see Appendix Table 1A). Next, children were asked what "most boys/girls" would do in each situation using two response options including a prosocial response (e.g., stop to try and help) and a selfish response (e.g., go straight to the movies). Participants were then asked what they themselves would do in this same situation using the same response options. Following their selection, children were asked whether they would feel good or bad about their decision, and how good or bad they would feel using a 3-point Likert scale (little, medium, or very good/bad). The order of response choices was randomized. Vignettes were sex matched, such that the characters in each vignette matched the sex (as assigned at birth) of the child participant.

Emotion Perspective Taking. Following the prosocial vignette task, children completed a measure of emotional perspective taking, taken from a larger perspective taking battery (Aslan & Köksal-Akyol, 2016). Children were presented with 16 vignettes (4 happy, 4 angry, 4 fear, and 4 sad) describing everyday situations and were asked to accurately label the emotion of the main character. The main character's face in each vignette is empty and does not show any emotion. The researcher presented each vignette image with a short description and then ask the child how the main character might feel (for example, "The girl's bike has broken. How does she feel?" or "The boy's mother is getting him an ice cream. How does he feel?"). If the child accurately described the main character's emotion, s/he received a score of 2, if s/he described the correct valence (positive or negative) but did not accurately label the emotion, s/he received a score of 1, and if s/he did not accurately provide any emotional information, s/he received a score of 0 (note the 1 point for valence was not used in the original task, it was either 1- correct label, or 0 not correct).

As a measure of children's prosociality, we assessed the proportion of trials that children stated that most boys/girls would act prosocially (prosocial-other) and the proportion of trials that children claimed they themselves would act prosocially (prosocial-self). Trials were excluded if the child failed to correctly answer at least one of the comprehension checks. Similarly, we also explored children's emotional responses to their decisions.

Parent Report Measures. Prior findings relating pet ownership to children's empathy and prosociality have been mixed and instrument dependent; we therefore included several complementary, validated parent-report measures that tap different but related aspects of children's social-emotional development, as well as parents' own empathy, rather than relying on a single instrument. Parents completed the Empathy Questionnaire (EmQue), a 20-item parent-report measure of children's empathy, validated for children between the ages of 1 and 6 years old (Rieffe et al., 2010). Parents responded to 20 items indicating the degree of empathy that their child showed over the last two months using a Likert scale including *no*, *sometimes*, or *often*. Children's empathy was assessed using the total score of all 20 items, with higher scores indicating more empathy. The EmQue also includes three subscales including Emotion contagion (6 items); Attention to others' emotions (7 items); and Prosocial responses to others' emotions (6 items).

Parents completed the Strengths and Difficulties Questionnaire (SDQ), a 25-item measure of children's positive and negative behaviors (Goodman, 1997). Parents responded to each item using a Likert scale including *not true*, *somewhat true*, and *certainly true*. Five items were reverse scored (items 7, 11, 14, 21, and 25). The measure includes five subscales including five items each: emotional problems, conduct problems, hyperactivity, peer problems, and a prosocial scale. The sum of the 5 items makes up each subscale, and scores can be scaled up pro-rata if at least 3 items were completed (e.g., a score of 4 based on 3 completed items can be scaled up to a score of 7 (6.67 rounded up) for 5 items). The measure also includes a total difficulty score which is the sum of all items except those from the prosocial scale, and an externalizing (sum of conduct and hyperactivity subscales) and internalizing (emotional and peer problems subscales) scales.

Parents completed the Children's Social Understanding Scale (CSUS- long form), a 42 (6 reverse scored: items 5, 12, 25, 35, 39, and 41) item measure of children's mental state understanding between the ages of 2 and 7 (Tahiroglu et al., 2014). For each item, parents were asked to decide whether each statement is definitely 1-untrue, 2-somewhat untrue, 3-somewhat true, 4-definitely true, or a don't

know (missing) response. This measure includes 6 subscales including belief, knowledge, perception, desire, intention, and emotion, as well as an overall score. For each scale/subscale, the item scores were summed and divided by the total number of items responded to. Higher scores indicate greater social understanding within each domain.

Parents also completed the Questionnaire of Cognitive and Affective Empathy (QCAE; Reniers et al., 2011), a 31 item (4 reverse scored: items 1, 2, 17, and 29) measure of cognitive and affective empathy among adults. For each item, adults were asked to decide which response best reflects the degree to which each statement relates to them using a scale from 1- strongly disagree, 2- slightly disagree, 3- slightly agree to 4- strongly agree. The cognitive empathy scale is comprised of the perspective taking and online simulation subscales, while the affective empathy scale is comprised of the emotional contagion, proximal responsivity, and peripheral responsivity subscales. For each scale/subscale the average of the items was taken, with higher scores indicative of greater empathy within each particular domain.

Finally, parents completed a brief demographics form including information about their own and their child's gender and racial/ethnic background, household income and education level, number of child siblings and pets in the home, and whether they lived in an urban, suburban, or rural environment.

Data preparation

Coding Conversations. For each picture book reading session, conversations were transcribed in Excel by trained researchers verbatim by utterance and speaker (parent or child) from the recorded videos and were then checked by another trained researcher for accuracy. An utterance was defined as an uninterrupted stream of language distinguished based on lengthy pauses, grammatical structure, and changes in vocal intonation (Drummond et al., 2014; Slaughter et al., 2007). Transcripts were then coded for EMST language from 6 different categories (primarily from Drummond et al., 2014, though see Brownell et al., 2013; Ruffman et al., 2002; Symons et al., 2006). These included utterances containing the following content: simple affect, desires, emotions explanations/elaborations, mental states, empathy, and other internal states (see Table 2A in Appendix for a full description of the coding scheme). For all categories, except empathy statements, we further coded whether the statement was a production state (e.g., labeling or explaining) or an elicitation statement (e.g., asking a question or otherwise eliciting a response). The proportion of EMST language provided by parents and children was used as the primary outcome measures. EMST utterances were coded for mental- and emotion-state content irrespective of their referent (dog, parent, child, or other, consistent with our aim of capturing how the presence of a real versus toy dog shaped the overall parent-child conversation rather than talk about the dog specifically. For each speaker, the proportion of EMST language was calculated as the number of utterances containing EMST content divided by that speaker's total number of utterances during the wordless picture-book interaction.

Reliability. One trained researcher coded all transcripts. To establish interrater reliability, an additional trained coder independently coded 33 % of the transcripts ($n = 60$, 50 % from each pet dog/no dog group). Cohen's Kappa (κ) was used to calculate reliability, with values between .60 and .79 (moderate agreement) to be considered acceptable, and values above .80 considered to be strong agreement between raters (Landis & Koch, 1977). Across the EMST codes, we obtained an average Cohen's κ of .96 (κ range = .78, 1.00), indicating a high level of agreement.

Coding Prosocial Vignettes. Children's responses to each question were coded by two independent coders and any discrepancies were resolved by a third coder. For the two comprehension check items assessing children's understanding of the vignette, each response was coded as accurate or inaccurate. Vignettes in which both items were inaccurate were dropped from analyses. For both the prosocial-self and prosocial-other, responses were coded as whether the child selected they (prosocial-self) or most boys/girls (prosocial-other) would engage in the prosocial behavior (sharing, helping) or not. To assess children's emotion ratings following decisions to make personal sacrifices in prosocial (helping/sharing) dilemmas, their responses were coded from feeling 1- very bad to 6- very good. For the current analyses, we only examined the proportion of vignettes children said they would engage in the prosocial behavior (prosocial-self) and the proportion of vignettes that children said most boys/girls would engage in the prosocial behavior (prosocial-other).

Data analysis plan

Our main analyses included a series of 2 (condition: real dog vs. toy dog) $\times$ 2 (pet ownership: pet dog vs. no pet dog) analyses of variance (ANOVAs) to examine differences in caregivers' use of EMST language, children's emotional perspective-taking, and children's prosocial behaviors. In addition, two simple linear regressions were conducted to test whether the proportion of EMST language used by parents and the proportion used by children predicted children's emotional perspective-taking abilities. Two additional regressions assessed whether the proportion of parent and child EMST language predicted children's prosocial behavior. In addition, child age (in months) was included in the correlation matrix and entered as a covariate in analyses of children's emotion perspective-taking and prosocial outcomes, as well as in the regression predicting EMST language from book condition reported in the Results because parents' and children's use of mental-state language varies with child age.

As part of our exploratory analyses, we also examined children's use of EMST language using a 2 (condition: real dog vs. toy dog) $\times$ 2 (pet ownership: pet dog vs. no pet dog) ANOVA. We also explored whether children's social-emotional outcomes varied by pet ownership status. Specifically, a series of independent samples t-tests were conducted to compare parent-reported measures of children's empathy (Empathy Questionnaire), positive and negative behaviors (Strengths and Difficulties Questionnaire), and mental state understanding (Children's Social Understanding Scale) between children who currently live with a pet dog and those who have never lived with a pet dog.

Outliers were identified as values exceeding ± 3 standard deviations from the mean and were evaluated for all main measures of interest: parents' use of EMST language across book conditions, children's use of EMST language across book conditions, children's

prosocial vignette scores, and children's emotional perspective-taking scores. All analyses were initially conducted with outliers included. If the exclusion of outliers meaningfully altered the results, we reported the findings with outliers removed in the manuscript and included the full analyses with outliers retained in a [supplementary file](#).

Results

Descriptive Statistics

[Appendix Table 3A](#) provides the means and standard deviations for parents' and children's EMST language, child emotion perspective taking, self-prosocial and other prosocial behavior, children's social understanding (CSUS), parent-reported child empathy (EmQue and EmQue subscales), and children's behavioral difficulties (SDQ) scores. [Appendix Table 4A](#) provides correlations between children's age in months and parent and child EMST language, emotion perspective, self-prosocial, other prosocial, CSUS, EmQue, and SDQ scores.

Use of EMST language

To examine differences in parents' use of EMST language, we conducted a 2 (book condition: real dog vs. toy dog) $\times$ 2 (pet ownership: pet dog vs. no pet dog) ANOVA. There was a significant main effect of book condition, $F(1, 180) = 7.75, p = .006, \eta^2 = .04$, with parents using a greater proportion of EMST in the real dog book condition ($M = 0.27, SD = 0.16$) than in the toy dog condition ($M = 0.21, SD = 0.11$; see [Fig. 2](#)). There was no main effect of pet ownership, $F(1, 180) = 2.98, p = .086$, and the interaction between book condition and pet ownership was not significant, $F(1, 180) = 0.28, p = .597$. To address the possibility that the effect was driven by child age, we ran a regression predicting parents' EMST language from book condition, child age (in months), and pet-ownership status. Book condition remained a significant predictor, $b = -0.06, SE = 0.02, \beta = -.20, t(180) = -2.74, p = .007$, whereas neither child age, $\beta = .02, t(180) = 0.25, p = .800$, nor pet ownership, $\beta = .09, t(180) = 1.28, p = .201$, was a significant predictor. The overall model was significant, $R^2 = .05, F(3, 180) = 3.07, p = .029$.

Children showed a similar pattern in their production of EMST language. A 2 (book condition) $\times$ 2 (pet ownership) ANOVA revealed a significant main effect of book condition, $F(1, 179) = 10.11, p = .002$, with a greater proportion of EMST language used in the real dog book condition ($M = 0.13, SD = 0.10$) than the toy dog condition ($M = 0.09, SD = 0.08$; see [Fig. 3](#)). The main effect of pet ownership, $F(1, 179) = 0.44, p = .51$, and the interaction, $F(1, 179) = 0.88, p = .35$, were not significant.

Emotional perspective taking

We used a 2 (condition) $\times$ 2 (ownership) ANOVA to evaluate whether emotional perspective taking varied by book condition and pet ownership. There were no significant main effects of condition, $F(1, 180) = 0.35, p = .55$, or pet ownership, $F(1, 180) = 2.86, p = .09$, and no significant interaction, $F(1, 180) = 0.52, p = .47$. When controlling for child age, results remained non-significant for condition, $F(1, 179) = 0.48, p = .49$, pet ownership, $F(1, 179) = 2.24, p = .14$, and the interaction, $F(1, 179) = 0.14, p = .71$. Child age significantly predicted emotional perspective taking, $F(1, 179) = 47.91, p < .001$, with older children performing better.

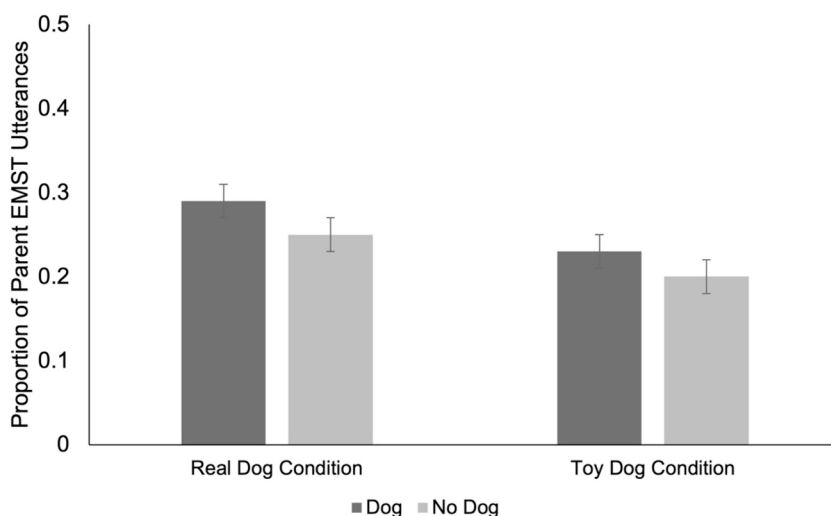


Fig. 2. Parent Use of EMST Language.

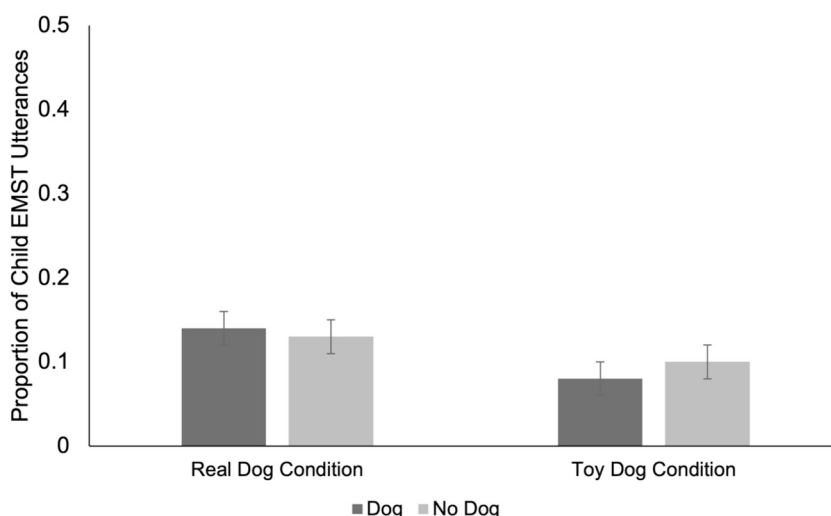


Fig. 3. Child Use of EMST Language.

Prosocial vignette task

Prosocial Behavior (self). We assessed differences in children's own prosocial responses and whether this varied by condition or pet ownership using a 2 (condition) $\times$ 2 (ownership) ANOVA. There were no significant main effects of condition, $F(1, 180) = 0.13, p = .72$, or pet ownership, $F(1, 180) = 0.04, p = .83$, and no significant interaction between the two, $F(1, 180) < 0.001, p = .99$. To account for age, a second model included child age as a covariate. Results again revealed no main effects of condition, $F(1, 179) = 0.15, p = .703$, or pet ownership, $F(1, 179) = 0.05, p = .83$, and no interaction, $F(1, 179) = 0.22, p = .64$. Only age was a significant predictor, $F(1, 179) = 62.68, p < .001$, with older children more likely to report they would act prosocially.

Prosocial Behavior (other). Next, we evaluated children's predictions about others' prosocial behaviors using a 2 (condition) $\times$ 2 (ownership) ANOVA. We found no main effect of condition, $F(1, 180) = 0.55, p = .46$, pet ownership, $F(1, 180) = 1.16, p = .28$, and no interaction, $F(1, 180) = 0.50, p = .48$. When controlling for child age, results remained nonsignificant. Similarly, child age was a significant predictor, $F(1, 179) = 17.30, p < .001$, with older children more likely to attribute prosocial behavior to others.

EMST language and emotional perspective-taking

To examine whether the proportion of EMST language used by parents and children during the picture book task predicted better emotional perspective-taking in children we conducted a series of linear regressions. Neither parent nor child EMST language was a significant predictor when entered individually ($ps = .94$ and $.93$, respectively). We re-ran both models controlling for children's age and found that, although both models were significant overall ($ps < .001$), these effects were driven by child age, which was a significant positive predictor in both models ($ps < .001$). EMST language remained a non-significant predictor in both cases ($ps > .79$), suggesting that age, rather than EMST language, accounted for individual differences in emotional perspective-taking.

EMST language and prosocial behaviors

We ran similar linear regressions to examine whether the proportion of parent and child EMST language predicted children's prosocial behavior, as measured by their self-reported prosocial responses on the prosocial vignette task. Neither parent EMST nor child EMST significantly predicted children's prosocial behavior ($ps > .39$). When controlling for age, neither parent nor child EMST significantly predicted prosocial behavior ($ps > .66$). In both models, only child age was a significant predictor of prosocial behavior ($ps < .001$), suggesting that older children were more likely to make prosocial choices regardless of EMST language use. The amount of EMST language used by parents or children during the picture book task did not significantly relate to prosocial responses, either independently or when controlling for age.

Parent reported outcomes and pet ownership

A series of independent-samples t-tests were conducted to examine whether children differed on parent-reported measures of empathy (EmQue), positive and negative behaviors (Strengths and Difficulties Questionnaire; SDQ), and mental state understanding (Children's Social Understanding Scale; CSUS) based on whether they currently lived with a pet dog or had never lived with a pet dog. No significant group differences were found across any of the measures. Children who live with dogs did not differ from those who do not on levels of empathy, $t(182) = -0.33, p = .74$, SDQ scores, $t(181) = 0.11, p = .92$, or mental state understanding, $t(181) = 1.49, p =$

.14. Parents who lived with a pet dog did not differ from those who did not on self-reported empathy (QCAE) ($t(181) = -0.28, p = .78$). Effect sizes were small and not statistically meaningful (Cohen's $d_s < |.23|$ across all comparisons).

Discussion

The purpose of the current study was to examine: 1) whether a wordless picture book featuring a real dog would elicit more emotional and mental state language than an otherwise identical book featuring a toy dog, 2) whether these effects varied by children's pet ownership, and 3) whether the storybook manipulation would increase empathic and prosocial behaviors. Overall, parents and children produced more EMST language when viewing and discussing a real dog versus a toy dog. These effects did not vary by pet ownership, suggesting that simply talking about a real dog elicits more EMST language during parent-child conversations than conversations about an inanimate lifelike dog. EMST language was not significantly related to any of the social-emotional outcome measures, including empathy, prosocial behavior, or emotional perspective taking.

The current study aligns with prior evidence that children living with pets hear more EMST language during parent-child conversations in the presence of their pet than during play with a lifelike toy (Reider et al., 2023). Our study produced similar findings that parents and children use more EMST language when viewing and discussing a real dog compared to a toy dog. However, the storybook manipulation did not produce discernible changes in children's empathy. Age was related to all of our prosocial measures with older children responding more prosocially. This suggests that the social-emotional constructs we aimed to measure are still developing and may be less sensitive to brief experimental manipulations at this stage.

As theory of mind emerges during early childhood, children become increasingly able to attribute internal mental and emotional states to others. This developmental shift may help explain why children used more EMST language when viewing and discussing a real dog than a toy dog, despite the absence of measurable differences in empathy or prosocial outcomes. This interpretation is consistent with evidence that children's attribution of goals and mental states to agents develops across infancy and early childhood (Baillargeon et al., 2016; Scott et al., 2022; Yu & Wellman, 2022), such that representations of real animals may be more readily construed as animate agents with thoughts and feelings. Importantly, this sensitivity to animacy and agency may arise earlier than children's ability to show consistent differences in empathy or other social-emotional outcomes. Thus, for children in the age range of this study, EMST language may reflect early social-cognitive abilities that are still closely tied to the specific situation, rather than consistent differences in empathy or prosocial behavior. Moreover, because the picture-book interaction was parent-led, parents likely directed much of the conversation, and children's EMST language was produced within a scaffolded rather than independent context. Interpretations of children's EMST use should therefore remain tentative, and the present findings speak most directly to parents' EMST language.

In addition to the development of theory-of-mind, empathy may depend on repeated, emotionally meaningful relationships that extend beyond brief experimental contexts. Although children can form bonds to their pets early in life, these relationships may not yet be sufficiently differentiated or stable to generalize to measures of empathy during early childhood. At younger ages, children's interactions with pets may be tied to specific situations or settings, rather than shaping how children think about others or respond empathically more broadly. Over time, as children's cognitive and emotional capacities increase, relationships with pets may become more salient sources of social-emotional learning. Indeed, prior work suggests that stronger bonds with pet dogs are associated with higher empathy and prosociality in older children (7 to 12 years old) (Hawkins et al., 2017; Muldoon et al., 2019). As a result, while children in the present study appeared sensitive to a representation of a real dog during the storybook, this sensitivity may not have translated into measurable differences in empathy or prosocial behavior based on pet ownership because these experiences may not yet generalize to how children think about or respond to others.

This study adds to the growing literature on the relation between empathy and pet ownership. Prior studies linking pet ownership to empathy and prosocial behavior have been primarily correlational, which limits conclusions about causality. Importantly, the current study addresses this gap through an experimental design and provides some of the first causal evidence demonstrating that simply viewing and discussing a real dog increased parents' and children's use of EMST language compared with a toy dog. This pattern aligns with recent findings that parents use more EMST language when interacting with dogs than with inanimate objects (Reider et al., 2023) and extends that work by showing that the effect occurs even among families who do not own a dog. Both dog-owning and non-owning families showed similar increases in EMST language, indicating that the presence of a dog can naturally invite conversations about emotions and internal states.

Several limitations should be considered when interpreting these findings. First, the storybook interaction was brief and took place in an online setting, which may not capture the richness of children's natural interactions with dogs. Because empathy and prosocial behavior develop gradually, a single opportunity to use EMST language with a representation of a real dog is unlikely to produce measurable changes in children's social-emotional outcomes. Although we included both parent-report questionnaires and child tasks assessing prosocial and empathic responses, these measures assess capacities that develop gradually over time and may not be expected to change after a single, brief interaction. Similarly, the storybook conversations reflected only a few minutes of conversation, which may not represent families' typical talk about emotions in daily life. These differences in scope and timescale could make it difficult to detect associations between EMST language and children's broader social-emotional outcomes. The sample also consisted largely of highly educated, White families, which may limit the generalizability of the findings to more diverse populations. We also note two measurement limitations. First, several of our measures used ordinal (Likert-type) response scales but were analyzed as if they were continuous; depending on how responses were distributed, this could affect our estimates. Second, we computed scale scores by summing or averaging items, which treats every item as equally informative and does not account for measurement error. Future work could use analytic approaches better suited to ordinal data and that model items as indicators of the underlying construct.

Future research should examine these questions over longer timescales and across repeated interactions. Longitudinal or

intervention designs could determine whether frequent, emotionally rich conversations about dogs predict later gains in empathy or prosocial responding. It will also be important to test how parent factors, such as attitudes toward animals, moderate these effects, as well as how child characteristics like age, temperament, attachment to pet, and prior experience with animals contribute to variability in outcomes. Expanding to community and educational settings could additionally reveal whether dog-related materials can serve as practical tools for fostering empathy-related discussions in children who may not have access to pets at home. Relatedly, our coding captured overall EMST rather than the referent of each utterance; coding talk at the utterance level could clarify whether a real dog specifically increases talk about dogs, as distinct from their overall conversations. In addition, although pet ownership did not moderate EMST language in this brief storybook context, ownership may shape parent–child talk and behavior in other settings—for example, during everyday caregiving routines with the family dog, or in children’s real-world helping and comforting behavior. Future work that samples talk and behavior across naturalistic, sustained contexts will be better positioned to detect ownership-related differences that a single laboratory interaction may not reveal.

Altogether, the current findings demonstrate that dogs can provide a meaningful context for eliciting emotional and mental state language in parent–child interactions. Going through a wordless book about a real dog, even briefly, encouraged richer conversation about internal states than one about a toy dog, and this effect was consistent across families with and without a pet at home. Although EMST language was not linked to children’s empathy or prosocial outcomes in this study, identifying a context that reliably promotes EMST is an important step toward understanding how everyday interactions with animals may contribute to social-emotional development. Continued research examining repeated and sustained experiences with dogs will help clarify when and how these early conversations translate into broader empathic growth.

CRedit authorship contribution statement

Nicole L. Oppenheimer: Data curation; Formal analysis; Project administration; Investigation; Writing – original draft; Writing – review & editing. **Lori B. Reider:** Conceptualization; Methodology; Investigation; Formal analysis; Project administration; Writing – review & editing. **Vanessa LoBue:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Table A1

Prosocial Vignette Task: Number of Children Who Passed Comprehension Checks.

Vignette Type	Number of comprehension checks passed, <i>n</i> (%)		
	Neither	One	Both
Helping-1	5 (2.7)	18 (9.8)	161 (87.5)
Helping-2	9 (4.9)	29 (15.8)	146 (79.3)
Sharing-1	10 (5.4)	20 (10.9)	154 (83.7)
Sharing-2	22 (12)	33 (17.9)	129 (70.1)

Table A2

Coding Scheme of EMST Language.

Category	Function & Examples	
	Production	Elicitation
Simple Affect Nouns, verbs, adjectives, or adverbs naming emotional feelings or behaviors, or states of preference, desire, or intention without expansion or emotion imitation	Production (SAP) • The dog is happy • The dog loves his toy • You like this toy	Elicitation (SAE) • Is he happy or sad? • How is he feeling? • Are you happy?
Desire References to wanting, needing something concrete	Production (DP) • He wants his ice cream • You want that toy • Help me	Elicitation (DE) • Does he need a hug? • What do you want to play with?

(continued on next page)

Table A2 (continued)

Category	Function & Examples	
	Production	Elicitation
Elaboration/Explanation Phrases or statements that explain or clarify the reason or possible cause for a particular mental state, or that provide background or context to help the child understand it, or that elaborate or explain how one infers or knows that a given mental state is being experienced	Production (EP) • He is sad because he doesn't have a hug. • He is scared because there was a loud noise. • You're excited because we get to play with these toys • that's why he's feeling sad.	Elicitation (EE) • Why is he sad? • How do you know he is angry? • Why are you upset?
Mental State References to the past, or to thinking, knowing, wondering, remembering, pretending	Production (MSP) • I think that's a cat. • You know this color	Elicitation (MSE) • What do you think he's doing? • Do you remember what she..? • Do you think he's hungry?
Other Internal State References to other internal states that are not affect- or mental state-related (e.g., physiological states)	Production (OISP) • He is hungry. • You seem tired.	Elicitation (OISE) • Did she get tired? • Are you hungry?
Empathy Statements Statements or emotion-related sounds that promote empathy with a character's emotion	Production (EMPP) • Aww. • Poor monkey.	
Prosocial Statements Statements that promote prosocial behaviors. These can refer to rewarding/encouraging the child for prosocial behaviors or asking someone to engage in prosocial behaviors or avoid/discouraging antisocial behaviors.	Production (PP) • Be gentle • oh that is so nice of you...good • That's nice of you to help her.	Elicitation (PE) • Can you be nice to her? • Can you be gentle with her? • Don't be mean to the dog/toy • Don't hit him. • You wanna give him a hug? • Can I get a kiss? • How would you help the puppy? • Can you help her?
Pronoun Use Statements in which the parent/child refers to the dog in the book by a name or pronouns, as well as referring to the animal as "it". Importantly, these references must be about the dog (toy or real) in the book. Not about any other characters in the book or about their own dog or other people. Words like "boy" or "girl" are not pronouns and should <u>not</u> be coded as "h" or "s".	Name (n) They (th) He (h) She (s) • Her name is <u>Lucy</u> • What are <u>they</u> doing? • <u>He</u> likes that treat. • <u>She</u> wants to <u>play</u>	It (it) • What is <u>it</u> doing now?

Table A3
Sample Descriptives.

Measure	Overall Sample		Pet Dog Group		No Dog Group		Real Dog Book		Toy Dog Book	
	M	SD	M	SD	M	SD	M	SD	M	SD
Parent EMST	0.24	0.01	0.26	0.01	0.26	0.01	0.27	0.02	0.21	0.01
Child EMST	0.11	0.01	0.11	0.01	0.12	0.01	0.13	0.01	0.09	0.01
Emotion PT Score	6.88	0.30	7.41	0.42	6.37	0.44	6.69	0.44	7.08	0.42
Self-Prosocial Score	0.60	0.03	0.61	0.04	0.60	0.04	0.61	0.04	0.59	0.04
Other Prosocial Score	0.63	0.02	0.66	0.04	0.61	0.03	0.61	0.03	0.65	0.04
CSUS	3.04	0.04	3.10	0.05	2.99	0.06	3.02	0.05	3.06	0.06
EmQue	39.15	0.42	39.01	0.56	39.29	0.64	38.27	0.54	40.1	0.64
Emotion Contagion	1.58	0.03	1.53	0.04	1.62	0.05	1.49	0.04	1.67	0.05

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Table A3 (continued)

Measure	Overall Sample		Pet Dog Group		No Dog Group		Real Dog Book		Toy Dog Book	
	M	SD	M	SD	M	SD	M	SD	M	SD
Emotion Attention	2.39	0.03	2.40	0.04	2.38	0.04	2.37	0.04	2.41	0.04
Emotion Prosociality	2.01	0.03	2.03	0.04	1.99	0.04	1.99	0.04	2.03	0.04
SDQ	16.33	0.37	16.37	0.54	16.29	0.51	16.27	0.50	16.4	0.56
QCAE	88.84	8.83	89.01	8.22	88.66	8.83	88.37	9.03	89.32	7.97

Table A4

Correlations Between Key Measures of Interest.

Measure	1	2	3	4	5	6	7	8	9	10
1. Age (in months)	—									
2. Parent EMST	.02	—								
3. Child EMST	-.01	.43**	—							
4. Emotion PT Score	.46**	-.01	-.01	—						
5. Self-Prosocial Score	.51**	.05	.06	.35**	—					
6. Other Prosocial Score	.30**	-.01	-.02	.26**	.58**	—				
7. CSUS	.44**	.09	.06	.29**	.43**	.39**	—			
8. EmQue	.09	-.07	-.02	.13	.24**	.23**	.44**	—		
9. SDQ	-.13	-.02	.21**	-.11	-.08	-.02	-.19*	.04	—	
10. QCAE	.02	.18*	.04	.02	.17	.12	.24**	.27**	-.00	—

Note. * $p < 0.05$. ** $p < 0.001$. Correlations were computed pairwise using all available data; children excluded from a specific task were excluded only from correlations involving that variable.

Appendix B. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jecp.2026.106605>.

Data availability

The data and stimuli for this study are available on Databrary (<https://databrary.org/volume/1905>).

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