Use of mental state language during educator-child and mother-child conversations about the past and future

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Abstract

Research findings: No research to date has compared mental state language (MSL) in conversations between children and different adult talk partners, such as mothers and educators. The aim of this study was to investigate the use of MSL (verbalisation of mental states such as remembering, knowing and thinking) by children, educators, and mothers during conversations about the past and future. Eighty-five educator-child dyads from seven childcare centers in Sydney, Australia participated in eight conversations that varied by temporal (past/future) and novelty (novel/familiar) focus. Ten educators talked with 40 younger children (27-36 months), and 11 talked with 45 older children (48-60 months). A subsample of 42 mother-child dyads completed the same tasks: 20 with the younger children (27-36 months) and 22 with the older children (48-60 months). Educators used significantly more MSL than mothers. Compared to diploma-qualified educators, degree trained educators were especially likely to use more MSL. Educators' MSL was significantly associated with children's MSL for future talk conversations only.

Practice: Educators' and mothers' MSL may influence children in different ways. Pre-service teacher training appears to facilitate educators' own use of MSL. More research is needed to determine why children use more MSL with their mothers than with their educators.

Key words: mental state language, educators, mothers, early childhood qualifications

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The process whereby young children develop understanding of their own and others' mental states is an important part of social development (Razuri, Hiles Howard, Purvis & Cross, 2017; Symons, 2004). This encompasses learning about emotions and the development of a theory of mind, that is, the ability to understand the mental states of one's self and others, accompanied with the knowledge that mental states can be aligned or competing and variable or static. The acquisition of language and in particular talk of mental states is the central mode through which young children first demonstrate their knowledge of their own and others' desires, wants and needs, with these skills first emerging around ages two to three years (Razuri et al., 2017). The understanding of beliefs, thoughts and knowledge are considered to emerge later at around ages four to five years (Razuri et al., 2017; Taumoepeau & Ruffman, 2008).While early research focussed on both social and cognitive developmental factors in attaining social understanding (Gopnik, 1993; Symons, 2004), recent research has investigated social interactions, expressly mother-child conversations, as a key mechanism through which young children learn about mental states (Ruffman, Puri, Galloway, Su & Taumoepeau, 2018).

There are particular benefits for learning and talking about mental states during conversations about the past and future (Van Bergen, Salmon & Dadds, 2018; Wareham & Salmon, 2006). Because these conversations are decontextualized – that is, independent of the current moment – they offer children an opportunity to reflect on their own and others' past and future inner states and experiences (for similar arguments regarding aspects of other child talk see McGuigan & Salmon, 2004, Taumpeomeau & Reese, 2013; Van Bergen, Salmon, Dadds & Allen, 2009). In conversations about the future specifically, there is a unique opportunity to anticipate future needs, to prepare for possible challenges by

considering the past, and to anticipate hypothetical scenarios (Hudson, 2002, Hudson & Mayhew, 2011). A robust body of sociocultural developmental research has shown how parents' use of mental state language in conversations, including terms such as "remember", "think", and "know" supports young children's own use of mental state references (Ensor & Hughes, 2008; Van Bergen et al., 2018). It is now timely to extend this research focused on parent-child use of mental state language in conversations about the past and future, to include other significant conversation partners.

There is recent strong evidence that educators' mental state language in everyday conversations may enhance a range of children' social, linguistic, and academic skills (Barnes & Dickinson, 2018; Grazzani, Ornaghi, & Brockmeier; 2016; Misailidi, Papoudi, & Brouzos, 2013), yet no research to date has examined educators' and children's use of mental state language in conversations about the past and future. Moreover, no research has considered the influence of different educator qualification pathways on educators' use of mental state language. The focus of the present study, therefore, was to examine educators' and children's use of mental state language in conversations about the past and future. We were interested to know how frequently educators with and without tertiary qualifications use mental state language in conversations about the past and future, and whether or not educators' and children's mental state language is related. To support comparability with previous studies, we also sought to compare educators' and mothers' use of mental state language when conversing with the same child.

Below we briefly outline the robust body of sociocultural developmental research examining the way in which parents discuss the past and future with their children. We highlight the influence of mental state language on a range of child outcomes. We then review current early childhood research examining educators' use of mental state language in other contexts, including everyday discussions and book-reading. We conclude by discussing

the specific aims and hypotheses of the present study, in which we ask educator-child and mother-child dyads to each discuss four past and four future events.

Mental State Language in Mother-Child Conversations about the Past and Future

Across more than 30 years, sociocultural developmental research focusing on parents, typically mothers, shows how adults scaffold and extend children's developmental outcomes during rich and elaborative conversations about the past and future (Fivush, Haden & Reese, 2006; Hudson, 2004, 2006; Salmon & Reese, 2016; Wareham & Salmon, 2006). Mental state language references are intrinsic to these mother-child reminiscing conversations, as reminiscing is memory for personally experienced events (Fivush et al., 2006; Nelson & Fivush, 2004, Taumoepeau & Reese, 2013) and future talk requires children to utilise their understanding of self and to draw on either their existing knowledge base or their imagination for events that they have not yet experienced (Hudson, 2006; Hudson & Mayhew, 2011; Nelson & Fivush, 2004). Nelson and Fivush's (2004) account of the development of autobiographical memory suggests that mental concepts are connected to children's narrative structure and content stemming from reminiscing conversations as well as from more endogenous areas including self-representation and theory of mind. A key part of self-representation is to form evaluations of the self (Nelson & Fivush, 2004). Initially, these self-representations focus on observable features including physical (e.g., "I am tall"), social (e.g., "I'm kind") and psychological attributes (e.g., "I'm happy") (Wang, Hou, Tang & Wiprovnick, 2010). However, as reminiscing and future talk conversations begin to include discussions on what the child feels and why, this naturally leads to mental state language.

Furthermore, the research shows that mothers who make more frequent reference to various cognitive states, including beliefs, thoughts, preferences, and desires, typically have children who do the same (Fivush et al., 2006; Rudek & Haden, 2005; Wareham & Salmon, 2006). This is initially the case for shared conversations, in which mothers elicit young

children's own mental state references by asking them to reflect on their own internal states at the time of the event; by prompting them to consider others' perspectives; and by modelling the construction of evaluative and mental-state-rich narratives themselves (Rudek & Haden, 2005; Taumoepeau & Reese, 2013). Over time children who frequently experience such conversations should eventually come to internalize the skills for mental state language independently and develop cognitive perspective taking skills (Ruffman, Slade, & Crowe, 2002; Tompkins, Benigno, Kiger Lee, & Wright., 2018). Such children should also demonstrate stronger understanding of others minds with important social benefits (Ruffman, et al., 2002; Tompkins et al., 2018).

An important finding within sociocultural developmental research is that conversational approaches between mothers and children appear stable across time and contexts. In the case of mothers, for example, there is remarkable stability in conversational approaches between mothers and siblings within a family unit (Fivush et al., 2006; Haden, 1998). Thus, individual differences in maternal reminiscing or future talk that are identified in a single experimental session are likely to reflect enduring differences in children's lived experiences across time (Fivush et al., 2006). Although longitudinal evidence related specifically to mental state language is limited, a similar pattern of stability emerges. Rudek and Haden's (2005) study of 21 mother-child dyads is one example of this. They asked mothers to talk with their 30-month-old children about three past events they had recently experienced together (e.g. trips to the zoo or park; visiting grandparents). Using a mental state language lexicon with 17 terms (e.g. *know, think, remember, guess, pretend*), the number of mental state references made by mothers was counted. For example, use of the mental state term (know) in an utterance such as, "Did you *know* the plant grew flowers?" would be counted as one mental state reference and the use of a mental state term (remember) in an utterance such as, "*Remember* Arabella's birthday party, do you *remember*?" would also only be counted

once because the second use is a repetition. Thus mental state references were only coded if they applied to new information, not repetitions. The reminiscing task used at 30 months was then repeated one year later. Findings were twofold. First, there was a high degree of consistency in mothers' use of mental state language at both timepoints (Rudek & Haden, 2005). Second, children who were exposed to more frequent maternal mental state language at 30 months were likely to use a greater number of mental state terms themselves at both 30 and 42 months. They were also more likely to use more sophisticated memory strategies when asked to remember a series of familiar objects.

Educator-Child Mental State Language

In recent years, and across a number of Western countries including Australia, Denmark, Germany, Italy, New Zealand, Norway, Spain, Sweden, the United Kingdom, and the United States, the proportion of young children enrolled in childcare has rapidly increased (Organisation for Economic Co-operation and Development, 2018). Children in their toddler and preschool years now spend significant portions of their week with early childhood educators (OECD, 2018), who provide both nurturance and pedagogical guidance (Manning, Garvis, Fleming & Wong, 2017; Tayler, Cloney, Adams, Ishimine, Thorpe, & Nguyen, 2016). The qualification pathways for early childhood educators within these settings vary, with some educators holding a tertiary degree and some holding a non-degree qualification, for example, a diploma in children's services, which is equivalent to one year of a four year tertiary teacher education degree (Australian Children's Education & Care Quality Authority (ACECQA), 2018a). Across both pathways, however, educators are taught to provide sensitive and responsive high-quality interactions by scaffolding and extending children's conversational contributions (Gunter, Calderella, Korth & Young, 2012; Kelley & Camilli, 2007; Kingston, Gates & Sammons, 2013; Manning et al., 2017). Educators are also encouraged to engage children in conversations and experiences that require planning, that

extend across time, and that benefit from reflection (Sylva et al., 2007). When engaging in conversations about the past and future, therefore, educators may be particularly likely to discuss mental states, their precedents, and their consequences.

Although no studies to our knowledge have considered educators' mental state language during conversations about the past or future, there is evidence of mental state language in everyday conversation. Importantly, individual differences also emerge. In one of the largest studies of its kind, for example, Frampton et al., (2009) observed 393 educators over a period of 2.5 hours each. Observations were broken into 20 second snapshots, and each snapshot was coded for mental state language. Mental state language was present in 22% of all snapshots. Interestingly, although positive caregiver interaction style predicted more frequent mental-state discourse from educators, staff-child ratios, class sizes, and staff qualifications did not. In a similar study, King and La Paro (2015) coded video observations of 34 Head Start educators for emotional and mental state talk. Educators' years of experience in Head Start correlated with their references to perception, but not to other emotional or mental state terms.

Over and above educators' individual differences in mental state language, there may also be contextual differences. There is evidence, for example, that educators may be especially likely to use mental state language during book reading. In a study by Misailidi et al., (2013), all 38 participating educators used mental state terms when reading to their preschool classes. Critically, it may not be the text itself that supports mental state use but the decontextualized nature of the conversation. Book reading and storytelling are activities that encourage use of decontextualized language (Curenton, Craig & Flanigan, 2008; Ziv, Smadjua, & Aram, 2013). For example, in book reading, parents and educators can question, elaborate on, and label the experiences of both the protagonists and themselves (Barnes & Dickinson, 2018; Levan & Aram, 2012; Ruffman et al., 2002; Symons, Peterson, Slaughter,

Roche, & Doyle, 2005; Taumoepeau & Ruffman, 2008; Ziv et al., 2015). Consistent with this possibility, mental state language is particularly high when educators are asked to tell a story using a book with no text (Ziv et al., 2015). Conversations about the past and future are similar to book reading in that both are decontextualized from the current situation. Given the decontextualized nature of past and future conversations, we suggest that – like book reading – these conversations may offer particular potential for the productive use of mental state language.

The Current Study

Our overarching research question was to understand how educators and children use mental state language in reminiscing and future talk conversations with one another. To investigate this we adopted the main methods used in studies of mother-child conversations about past and future events, and extended this paradigm to also include educator-child conversations. We used a repeated measures design in which educator-child dyads engaged in conversations about four types of events; namely: past novel, past familiar, future novel, and future familiar. To enable comparison, a subset of children engaged in the same conversation tasks with their mothers. The primary aims were to determine whether there was an association between educators' and children's use of mental state language, and to compare educators' and mothers' mental state language when talking with the same child about the past and future (see Ziv et al., 2015, for a similar approach using book reading). The secondary aims were to consider the influence of child age (toddler vs. pre-schooler) and educator qualifications (tertiary degree vs. diploma) on educators' mental state language. As in past research with parents (e.g. Ensor & Hughes, 2008; Rudek & Haden, 2005), we operationalized mental state language as any references to cognition, intentionality, or belief: thus, participants who used more mental state language were those who made a greater number of references to their own or others' internal states. We note that data from this study

have previously been analysed for other aspects of educator-child talk, including the use of an elaborative conversation style in different conversational contexts (see Andrews, Van Bergen & Wyver, 2019).

Consistent with sociocultural developmental theory (e.g. Nelson, 1993, Fivush et al., 2006), we hypothesized that educators use of mental state language during conversations about the past and future would be significantly associated with children's use of mental state language (H1). Given their years of professional training and experience in engaging children in rich and meaningful conversation, we further hypothesized that educators would make more mental state references than mothers (H2), and that degree-trained educators would make more mental state references than diploma-trained educators (H3). Finally, we hypothesized that educators and mothers would each use a greater number of mental state references with older children, who are more likely to understand a range of inner states, than with younger children (H4). H4 aligns with sociocultural developmental theory, in which competent adults scaffold and extend children's abilities as the children become more capable (Rogoff, 2003; Nelson, 1993; Nelson & Fivush, 2004; Wareham & Salmon, 2006; Salmon & Reese; 2016).

Method

Participants

Participants in this study included 85 children, 21 educators, and 40 mothers from seven childcare centers in Sydney, Australia. Ten educators worked with younger children in the toddler years (n = 40) and 11 educators worked with older children in the preschool years (n = 45). Nine educators had a diploma level early childhood qualification and 12 educators had an early childhood teaching degree, with teaching experience ranging from less than one year to more than 15 years. Ninety-two parents agreed for their children to participate, of these seven children were lost to attrition: two children left their childcare center

unexpectedly prior to data collection, four children were absent due to illness or holidays, and one child chose not to participate. Data from these children were not included in the study. The final sample included 40 younger children, aged 27-36 months (*M*=33.45, *SD*=2.24, 23 female), and 45 older children, aged 48-60 months (*M*=53.44, *SD*=3.81, 29 female). There was no difference in children's gender across age groups, X^2 (2, *N* = 85) = .430, *p* = .512. Only one family, with a child in the younger age group, identified as Indigenous. This is representative of population census data where 3.3% of Australians identify as Indigenous (Australian Bureau of Statistics (ABS), 2016). All mothers were invited to participate and forty agreed. Two mothers each had two children participating: thus, there were 42 mother-child dyads overall. Twenty-two dyads had older children (12 female), and 20 dyads had younger children (10 female). For both the older and younger age groups, there was no variation in the age or gender of children whose mothers did and did not participate, *t*s < 1.58, *p*s > .114. Eighty-five percent of mothers who participated were married. Their qualifications ranged from high school completion (n = 7), vocational qualifications (n = 8), to Bachelor (n = 14) and postgraduate degrees (n = 12). Overall, the qualification levels of educators and participating mothers did not significantly differ, X^2 (1, *N* = 40) = 1.58, *p* = .208. Mothers who participated were employed in predominantly professional or self-employed roles (n = 27) with homemaker (n = 5) and student (n = 4) the next most common occupations.

Procedure

Recruitment. Following ethical approval from the Macquarie University Human Ethics Management, thirty centers that met the national criteria for high standards in education and care (ACECQA, 2018b) and who were located within one hour's drive of Macquarie University were invited via phone to participate. All but five of the centers contacted operated a service for children birth to five years of age. The other five each

operated a service for children two to five years. Center directors who expressed interest were emailed a detailed project description and asked to discuss the project with their toddler and preschool educators. This project description outlined that the study would examine how educators and children discuss the past and future. To avoid priming the inclusion of particular content, it did not specify that mental state language would be coded (see Taumoepeau & Reese, 2013, for a similar approach). Directors were then contacted again by phone one week later. Centers who were still interested were visited by a researcher (the first author) who explained the study aims and process in more detail. Following this process, seven centers had at least one educator who agreed to take part. These seven centers were included in the study. Two were in areas of high socio-economic disadvantage, and five were in areas of high socio-economic advantage as measured by the community-level "Index of Relative Socio-economic Advantage and Disadvantage" scores (ABS, 2014). We controlled for socio-economic status (SES) using these scores as a covariate.

Each educator was asked to nominate up to six children from their classroom who could be invited to participate in the study. They were instructed that the children they choose to nominate should (i) attend the childcare center a minimum of three days per week, on days that the educator also worked, and (ii) speak English at home. Parents of those children were also invited to participate by returning a written invitation and consent form that had been left for them in the child's school bag, locker, or similar. Parents who returned their consent forms could elect for their child to participate but not themselves (e.g. if work commitments prevented attendance at the center), or for both to participate.

Educator and parent questionnaire. To capture demographic information about the participants, educators and mothers each completed a separate paper-and-pencil questionnaire in their own time. They were asked to return the questionnaire to the researcher in person or by post. Stamped and addressed envelopes were provided for this purpose. The educator

questionnaire asked educators to report their education, teaching experience, and current work arrangement and patterns. The parent questionnaire asked mothers to report their child's date of birth, language/s spoken at home, and childcare enrolment pattern, and their own education, occupation and marital status.

Educator-child conversations. To capture mental state language during conversations about the past and future, each educator-child participated in four different types of conversations together: past novel, past familiar, future novel, and future familiar. To facilitate this process, educators were first asked to nominate four past events and four future events that they had participated in with each child. Based on previous research with mother-child dyads (Hudson, 2002; Reese & Brown, 2000), they were instructed that familiar events were those that occur often throughout the year and novel events were those that typically do not occur more than once per year. No restrictions were placed on the time when the events had occurred or potentially would occur, rather, the educators were asked to nominate events that they believed the child would remember or be able to talk about in terms of a future event. Educators who were paired with multiple children completed the task once for each child. They were asked to nominate unique events for each child where possible, but occasionally used the same event for two or more children: for example, a magic show that had taken place at the center.

Once events had been nominated, they were discussed over two different sessions. On one day, four past events were discussed with each child, and on the other day, four future events were discussed with each child (counterbalanced). Half of the events on each day were familiar and half were novel (counterbalanced), with two conversations per event type (i.e. two past-familiar and two past-novel events on one day; two future-familiar and two future-novel events on the other). Educators were instructed to discuss each event with the

child as they normally would, and to move to the next event when the previous conversation had finished.

Educator-child conversations occurred in a quiet familiar area of the center that was not currently being used by other children (e.g. sleeping booths, inside areas that were not currently being used when others in the class were outside). At the beginning of each conversation session, children were shown the voice recorder by the first author and lead researcher to ensure they understood when the conversations were being recorded. They were then asked to give verbal assent to participate. The children were afforded time and opportunity to consider their decision and during conversation recordings they were reminded that they could elect to stop participating (Dockett & Perry, 2011, McDonald, 2013). Additionally, signs of tiredness and disinterest were looked for by the educators, mothers or researcher. One child declined after two invitations to join a conversation and his preference was respected. All conversational data for this child was removed from the study. Once the educators and consenting children indicated that they were comfortable with the procedure, the researcher left the room and allowed for each conversation to be conducted in private. Half an hour was allocated for each session to allow time for the conversations and any associated breaks. No dyad exceeded this time. Six children required a bathroom break midway through their sessions, but no children required any other kind of break (e.g. due to tiredness). All conversations were audio-recorded for subsequent transcription and coding.

To ensure that staff-child ratios were not affected by the absence of the educator from their regular activities, funds were provided to employ relief staff in each setting. This enabled educators to work one-on-one with each participating child, away from the distractions of the room and was the only incentive offered to centers.

Mother-child conversations. Mother-child conversations were conducted across two days in the same quiet space in the center as for the educator-child conversations. The

sessions occurred during childcare hours at a time convenient for the mother. Typically this was at drop off or pick up time. The procedure for nominating topics, initiating and recording these conversations was the same as for the educators, with the same instructions given to mothers as to educators. All children assented to participate and were monitored for any sign of fatigue. All sessions were held as close together as possible, typically occurring within a two to three week timeframe. All mother-child conversations occurred after the educator-child conversations.

Analyses

Educator-child and mother-child conversation coding. All educator-child and mother-child conversation recordings were professionally transcribed and checked by the first author for accuracy. Using Rudek and Haden's (2005) mental state language lexicon, the first author then coded all transcripts for adult and child references to 17 different mental state terms: know, think, remember, mean, forget, guess, pretend, want, hope, wonder, wish, bet, figure, believe, understand, suppose, and mind. The lexicon includes all tenses and plural forms of each word, for example, think/thought, know/knew, remember/remembered, therefore it could be applied to coding of past and future events (Rudek & Haden, 2005). We also included an 18th term in this lexicon, the Australian English term "reckon", which is a colloquial term referring to cognition ("I reckon it might rain this afternoon"). For example, in the excerpt below, the educator would have a total score of six mental state language references (remember (2), reckon (1), know (2), think (1)) and the child would have a total score of two (remember (1), know (1)):

Educator: Do you *remember* what happened in the magic show?

Child: A rabbit came out of his hat. Umm, I *remember* a, a bird came out of his book.

Educator: The bird, that's right, the bird did come out when he was reading it. Did he do anything else that was pretty special?

Child: Umm, the table, by magic the table flew by itself.

Educator: The table flew, oh, did it? Oh, it did, I *remember* that. How did they do that, do you *reckon*?

Child: Umm, I don't *know*.

Educator: You don't *know*. I don't *think* I *know* either.

Child: Maybe by his magic wand.

To ensure interrater reliability, and consistent with other sociocultural developmental research (e.g. Andrews et al., 2019; Reese & Brown, 2000; Rudek & Haden, 2005; Taumoepeau & Reese, 2013) a research assistant who was blind to the study aims recoded a random sample of 25% of the transcripts. The two coders together achieved 95% agreement for educators' mental state language, 100% agreement for children's mental state language, and 100% agreement for mothers' mental state language.

Preparatory data analysis. Before commencing our primary analyses, we conducted three checks of our data. First, because educator-child and mother-child dyads each participated in two conversations for each event type, we examined correlations in each participants' use of mental state language scores across the two conversations. This process was repeated for each of the four types of events: past novel, past familiar, future novel and future familiar. For educator-child conversations, correlations in educators' mental state talk were significant for all types of events: all rs $\geq$.55, all ps < .034. For both educator-child and mother-child conversations, correlations in children's mental state talk were also significant for all types of events, all rs $\geq$ .29, all ps < .050. Finally, for mother-child conversations, correlations for mothers' mental state talk were significant for past familiar, future novel, and future familiar conversations (rs >.45, ps <.018), but not past novel conversations (r=.18, p=.27). As our results overall suggest consistency in individual conversations about each type of event, we averaged the scores for each pair of conversations to use in our analyses.

Second, we checked each mental state language variable for skew and kurtosis. One outlier was removed and the skew scores for educators' and mother's use of mental state language across each conversation type was < 1.09 and <1.39 respectively. The kurtosis scores for educators' and mother's use of mental state language across each conversation type were <1.39 and <0.63 respectively. Although demonstrating mild skew, these scores are considered to be within the acceptable range (see West, Finch & Curran, 1995). Given that all values were acceptable, and given that ANCOVA is a robust test that copes with a mild skew, we ran the analyses without transformation of the data.

Third, to ensure that educators and mothers do not systematically use more mental state language with boys or with girls, we initially added child gender as a covariate in all analyses. The covariate was not significant in any case, and gender was subsequently excluded from all subsequent analyses.

Primary data analysis. Our main approach to analysing educator-child and mother-child use of mental state language was threefold. First, and in line with our first hypothesis, we used Pearson's correlations to test for an association between educators' and children's mental state language. A separate set of correlations was produced for each conversation type: past novel, past familiar, future novel and future familiar. Second, to better understand when and why educators are most likely to use mental state language, we used a repeated-measures ANCOVA to determine if there is an influence of temporal focus, event type, educator qualification, or child age on educators' total number of mental state language references. Event temporal focus (past/future) and event type (novel/familiar) were entered as within participant variables and child age (younger/older) was entered as a between-subjects variable. Center-based socioeconomic advantage and educator qualification were entered as covariates. We elected to enter educator qualifications as a covariate and not a between-subjects variable because we had not intentionally sampled an equal number of educators

with diploma or degree qualifications. Inclusion as a covariate nonetheless allowed us to test for differences between diploma- and degree-qualified educators. Finally, mental state language scores were entered as the dependent variable. Effect sizes are reported as partial eta squared (η_p^2), where .02 is considered small, .06 is considered moderate and .14 is considered large. This allowed us to answer our third and fourth hypotheses, related to educator qualifications and child age, and to also determine how these findings might differ across different conversations. Another repeated-measures ANCOVA was used to examine the influence of these same factors on children's mental state language references.

Third, and using our subsample of children who participated with both their educator and their mother (n = 42), we repeated our analyses above. Specifically, we examined and compared correlations related to educator-child and mother-child uses of mental state language across the four conversation types. We then repeated our initial repeated-measures ANCOVA with language partner (educator or mother) entered as an additional within-subjects variable. In our final analysis with the subsample, we entered language partner (educator or mother) into our analysis of child mental state language. We conducted a mixed model analysis using participant number as a random effect. Conversational partner and age-group were fixed effects. These subsample analyses allowed us to answer our second hypothesis, in which the mental state language of educators and mothers is compared.

Results

Association between educators' and children's use of mental state language

To determine the associations between educators' and children's use of mental state language, Pearson's correlations between educator and child were run both for the whole group, and for the younger and older age groups separately. When both age groups were considered together, children's and educators' mental state language was significantly associated for future novel and familiar conversations, but not for past novel or familiar

conversations. When we considered correlations by age group, a similar pattern emerged. Educators' mental state language was associated with younger children's mental state language during future novel and familiar conversations but not either past conversations. Educators' use of mental state language was only associated with older children's mental state language during future familiar conversations and not any other conversation type (See Table 1).

Variation in educators' mental state language according to temporal focus, event type, child age and educator qualification

The ANCOVA revealed a significant main effect for temporal focus (See Table 2). Educators made more mental state references when talking about future events (M = 29.95, SD = 16.27) than when talking about past events (M = 23.51, SD = 10.86). There were no main effects for age or event type focus and no interactions. Turning to our covariates, for center-based socioeconomic advantage, there was no main effect and no significant interactions. However, educator qualification presented a significant main effect, with degree-qualified educators using significantly more mental state language (M = 59.87, SD = 23.97) than diploma-qualified educators (M = 38.81, SD = 15.01). For the interactions with educator qualification, there was highly significant interaction for educator qualification x temporal focus, and a moderately significant interaction for educator qualification x event type. Degree-qualified educators used more mental state language in future conversations when talking about familiar topics (M = 18.26, SD =11.03) than diploma-qualified educators (M = 7.55, SD =5.23).

Children's mental state language with educators

The ANCOVA considering children's use of mental state language revealed a highly significant main effect for age (See Table 2). Older children made significantly more (M = 13.07, SD = 10.79) mental state references than did younger children (M = .08, SD =4.66).

There were no further effects for temporal or event type focus and no interactions. Again turning to our covariates, for center-based socioeconomic advantage, we noted a moderately significant main effect. Children in centers of higher relative advantage made more mental state references (M = 8.66, SD = 11.19) than children in centers of lower relative advantage (M = 7.88, SD = 7.07). There were no significant interactions. Our covariate educator qualification showed no main effect, and there was no interaction for educator qualification x event type. There was a moderately significant interaction for educator qualification x temporal focus, children used more mental state language in conversations about the future with their degree-qualified educators (M = 6.30, SD = 6.78) when compared to their future conversations with diploma qualified educators (M = 2.11, SD = 3.12).

Association between mothers' and children's use of mental state language

When the younger and older age groups were combined, children's mental state language was associated with mother's mental state language for past familiar, future novel, and future familiar conversations but not for past novel conversations. When children were separated into age groups, the younger children's mental state language was associated with mother's mental state language in past familiar conversations, and but not any other conversations. For older children, mental state language was significantly associated with mothers' mental state language for past novel, past familiar and future familiar conversations but not future novel conversations (See Table 1).

Association between educators' and children's use of mental state language

For the subgroup of participants, educators' and children's use of mental state language was significant only in future novel conversations with all children and with the older children. Given the relatively small sample size, and given that the correlation coefficients were similar to those in the larger sample, we suggest that our subsample

analysis may have been underpowered. Nonetheless, we find that children's mental state language was more strongly related to mothers than to educators.

Comparison of educator-child and mother-child mental state language

The ANCOVA revealed a significant main effect for language partner (See Table 2). Educators used significantly higher levels of mental state language when in conversation with the children (M = 55.25, SD = 25.10) than did the mothers (M = 34.35, SD = 17.29). There was no main effect for age or for temporal focus, but there was a significant effect for event type with both educators (M = 29.90, SD = 14.07) and mothers (M = 20.23, SD = 8.50) using more mental state language in novel conversations when compared to familiar conversations. There was also a significant interaction for language partner x age, interestingly, educators used more mental state language with the younger children (M = 60.47, SD = 30.05) than older children (M = 50.52, SD = 19.15) and mothers used more mental state language with the older children (M = 38.62, SD = 19.21) than younger children (M = 29.63, SD = 13.87). No other interactions were noted.

In our final analysis we entered language partner (educator or mother) into our analysis of child mental state language. We conducted a mixed model analysis using participant number as a random effect. Conversational partner and age-group were fixed effects. Children's use of mental state language was higher for all conditions when the mother was the conversational partner and there was a significant effect for partner for all conditions (past novel, F = 9.57, p = .004; past familiar, F = 5.38, p =.026; future novel, F = 4.82, p =.031 and future familiar, F = 5.69, p =.022). The only significant effect for age was for future novel conversations (F = 14.38, p = .000).

Discussion

The present study aimed to examine educators' use of mental state language in conversations with children about the past and future. Using established reminiscing and

future talk procedures from the sociocultural developmental literature (Hudson, 2004, 2006; Salmon & Reese, 2016; Wareham & Salmon, 2006), a comparison of educator-child and mother-child mental state language was also conducted.

As hypothesized, we found that educators used more mental state language than mothers. This was true both for events that are novel and familiar, and in conversations about the past and future. Given that educators have formal training in the benefits of engaging children in conversations that are rich and complex, and in extending children's thinking (and their "thinking about thinking") (Piasta, Justice, Cabell, Wiggins, Turnbull, & Curenton, 2012; Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2004) they may therefore have had considerable practice in using mental state references across a range of conversations. We also found a greater number of mental state language references used by degree-qualified rather than diploma-qualified educators, which we take to further highlight the importance of formal qualifications. Although diploma-level educators frequently had a vast array of experience, degree qualifications offer an opportunity to engage more deeply in the most recent literature regarding strategies for supporting and extending children's thinking (Manning et al., 2017).

Contrary to our hypothesis, and despite the rich and robust number of mental state language utterances used by educators, we found that educators' use of mental state language was only partially associated with children's use of mental state language. Specifically, significant associations between educators' and children's mental state language utterances were observed for future talk conversations but not reminiscing conversations. Given that many of children's mental state language references during reminiscing come in response to those of their conversational partner (see Fivush et al., 2006; Wareham & Salmon, 2006), it is possible that educators' mental state references were less closely aligned with children's own interests than mothers. For example, some educators may have elected to model thinking

strategies to children by more frequently referencing their own mental states (see King & La Paro, 2015, for similar findings with emotions), or simply by referencing mental states that the child no longer remembers. However, highly elaborative reminiscing conversations should include references to the mental states of both parties (Van Bergen et al., 2018). In future talk conversations, where the event is necessarily more speculative, both educators and mothers may have been better able to align their contributions with the child's.

It is also possible that educators were focussed on eliciting the children's beliefs and thoughts about the events and therefore did not accompany their mental state language utterances with detailed explanations. This is an important consideration because research with mothers shows that mental state language is a better predictor of children's use of mental state language if accompanied by age appropriate explanations (Peterson & Slaughter, 2003).

In line with our last hypothesis, and consistent with sociocultural developmental theory, educators made a greater number of mental state references when conversing with the older children than younger children. The same was true for mothers. This finding suggests that both educators and mothers were aware that the older children are more likely to understand a range of inner states when compared to their younger peers. Interestingly, and despite the greater overall use of mental state language by educators, children's mental state language appeared to be more strongly influenced by their mothers. There were strong and significant correlations between mothers' and children's use of mental state language across most conversations, but not between educators' and children's use of mental state language. One possible explanation for these findings is that as degree-qualified educators used more mental state language in future conversations than in past conversations it may be that the content of future conversations, which by nature of their temporal focus, require children to project their thoughts forward to yet to be experienced events are more complex. Conversations about the future are believed to be more difficult than conversations about the

past (Atance & Jackson, 2009) so although educators themselves were able to readily include mental state talk in the conversations about the future, for example, “What do you think will happen?” it may be the future temporality of the conversation and the requirement to talk about yet to be experienced events that is difficult for the children.

An alternative possibility is that educators’ training may cause them to use mental state language differently to mothers. We allude to this possibility above, when we consider the low associations between educators’ and children’s mental state language use. As part of their training and professional repertoire, for example, educators are encouraged to frequently use open-ended questions about thinking with children. Thus, rather than responding specifically to children’s own conversational contributions, questions such as “What do you think…?” may come to educators relatively automatically. Although mothers in our sample had levels of education equivalent to those of the educators in our sample, many are likely to have studied in areas unrelated to education or to child development. Such mothers may have no training in strategies for eliciting children’s thinking and are unlikely to rely on these same strategies. Future research into both educators’ and children’s use of mental state language and children’s knowledge of mental intentions could attempt to disentangle this.

Implications for practice

Our finding that educators with teaching degrees used more mental state language than educators with diplomas suggests that educator qualifications and training have an important impact. Although we do not know the precise reasons why degree-qualified educators used more mental state language than diploma-qualified educators, one possibility discussed above is that extended training in the importance of rich and complex conversations equips degree-qualified educators to generate more mental state references. Thus, professional development that further supports educators to understand the importance of such conversations may also be effective in increasing mental state language content

amongst diploma-qualified educators too.

Consistent with this possibility of new professional development opportunities that focus on mental state language during conversations about the past and future, there is evidence that mothers can be coached to engage in elaborative and emotion-rich conversations when reminiscing about the past (Van Bergen et al., 2009; Van Bergen et al., 2018). Moreover, recent intervention work shows that educators can also be successfully coached to use more mental state language and emotion language when communicating with toddlers in everyday contexts (Grazzani, Ornaghi, Agliati, & Brazzelli, 2015). Taking these findings together, we highlight the potential for professional development providers and individual educators to consider the influence of mental state language coaching during reminiscing and future talk. As a caveat, we note that educators' mental state language was related to children's mental state language only for future talk conversations, and not past talk. While further research is required to determine why this was the case, we recommend that intervention and professional development programs ensure that educators feel equipped to engage children in future talk conversations specifically (e.g. planning, anticipating, and predicting upcoming events). It is also important that professional development is focussed on the quality and kind of mental state language used, and that children are given frequent opportunities to respond using their own mental state terms. Such training may be useful for both degree- and diploma-qualified educators.

Limitations and implications for future research

First, we highlight the potential for future research to continue to consider the potential socialising influences from all conversational partners in children's lives. While this study considers educators as socialising agents, others such as grandparents, siblings, and peers are also likely to offer socialising benefits. At present, it is not known how these

different groups might interact to support children's own mental state language conversational contributions.

Second, there is an inherent assumption in sociocultural developmental theory that the more competent adult will scaffold and support young learners. Given that reminiscing between mothers and children becomes increasingly bidirectional with time, it is possible that each child's own individual skills and characteristics may also influence educators' reminiscing and future talk contributions. Future studies conducted in educational contexts should include measures of other child outcomes; including personality, understanding of minds, and emotion knowledge and consider whether individual child characteristics might influence educators' and the children's own mental state references in conversation. We position this as an important next step in the research.

Third, all centers included in this study were rated as meeting a high standard based on national criteria. Although this allowed us to limit our study to centers in which educators are likely to be working particularly effectively, we note that children at greater risk are more likely to attend centers that do not yet meet a high standard. It is important that educators' and children's mental state language across both contexts be tracked and compared.

Fourth, we acknowledge that the context for the conversations in this study may have been unusual for some mothers. While mothers and educators frequently engage one-to-one with children, some mothers spend less time than others engaging in such talk in the childcare center. For example, one conversation commenced with; Mother: "What am I doing here?", Child: "I don't know.", Mother: "It seems a bit funny, doesn't it?" However, as previous research has produced consistent findings about parent-child reminiscing across a range of contexts, including unfamiliar university laboratories and familiar home settings (see Fivush et al., 2006, Reese & Salmon, 2016; Wareham & Salmon, 2006) it seems unlikely that the contextual changes will have influenced the use of mental state language in this study.

We conclude by highlighting that the procedures used to examine mothers' and children's reminiscing and future talk conversations in sociocultural developmental research provided a rich opportunity for investigating educators' use of mental state language in similar conversations with children.

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