

**MATERNAL ENGAGEMENT, MIND-RELATED TERMS, AND
CHILDREN'S UNDERSTANDING OF THE MIND**

**by
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BA, Rutgers, The State University of New Jersey, 2000

Thesis in Partial Fulfillment
of the Requirements for the Degree of
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Abstract

The present research is a longitudinal study of the relations between maternal engagement, mothers' use of mind-related terms, and children's understanding of the mind. Each of the three aspects of maternal engagement that were assessed as well as mothers' use of mind-related terms were found to be concurrently associated with children's performance on false belief tasks. Mothers' use of mind-related terms was found to be positively correlated with all three dimensions of maternal engagement as well. At a two-year follow up, the Time 1 maternal engagement variables, but not mothers' use of mind-related terms, were associated with children's understanding of interpretation.

Keywords: Theory of Mind; Parenting

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Table of Contents

Approval	ii
Abstract	iii
Acknowledgements	iv
Table of Contents	v
List of Tables	vi
Introduction	1
Methods	11
Participants	11
Design and Procedure: Time 1	12
Interaction Task 1: Dollhouse Task	13
Interaction Task 2: Storybook Task	13
Parental Engagement	14
Mind-related Terms	16
False Belief Tasks	17
Design and Procedure: Time 2	18
Understanding of Interpretation	18
Ambiguous Figure	18
Referential Ambiguity	20
Lexical Ambiguity	21
Results	22
Descriptive Statistics for All Study Variables	22
Zero-order Correlations Among All Study Variables	23
Partial Correlations Among Time 1 Variables	25
Longitudinal Relations	25
Regression Analyses	26
Range Restricted Data Set	28
Discussion	30
References	36

List of Tables

Table 1.	Descriptive Statistics for All Study Variables	22
Table 2.	Zero-order Correlations Among Study Variables.....	24
Table 3.	Partial Correlations Between Time 1 Predictor Variables and Children's False Belief Performance at Time 1, Controlling for Child Age (n=64).....	25
Table 4.	Partial Correlations Coefficients Between Time 1 Predictor Variables and Understanding of Interpretation at Time 2, Controlling for Time 1 False Belief Understanding and Time 2 Age (n=45).....	26
Table 5.	Predicting False Belief Understanding from Age, Mothers' Mind- Related Term Use, and Parental Engagement Variables.....	27
Table 6.	Predicting False Belief Understanding from Age, Parental Engagement Variables, and Mothers' Mind-Related Term Use	28
Table 7.	Summary of Regression Analyses Predicting Children's Understanding of Interpretation at 81-months	28

Introduction

It is well established that children's understanding of the mind is associated with individual differences in family experience (Carpendale & Lewis, 2004). Both observational ratings of mothers' parenting style and specific aspects of maternal language are reported to be concurrently and longitudinally associated with variations in children's understanding of the mind (Hughes, Deater-Deckard, & Cutting, 1999; Ruffman, Perner, & Parkin, 1999; Vinden, 2001; Fonagy, Steele, Steele, & Holder 1997; Meins, 1997; Meins Fernyhough, Russell, & Clark-Carter, 1998; Dunn, Brown, Slomkowski, Tesla, & Youngblade 1991; Moore, Furrow, Chiasson, & Patriquin, 1994; Ontai & Thompson, 2002).

Following the intuition that parents' use of mind-related language may be an important factor in children's social cognitive development, parents' use of so-called "mental state terms" has become a point of focus in developmental research (on the underappreciated distinction between mind-related and mental state terms, see Susswein & Racine, in press).¹ Typically, positive relationships are found between parents' use of mind-related terms and children's performance on social cognitive tasks (e.g., Ruffman, Slade, & Crowe, 2002). However, there is debate regarding whether it is the simple presence of mind-related terms or their appearance in particular types of

¹ Briefly, some but not all of the psychological predicates that are typically referred to as 'mental state terms' denote genuine mental states. For example, 'A is surprised', and 'B is attending to X' describe agents' respective states of mind. In contrast, belief, desire, and knowledge are typically not state-like, although awareness of one's own or another's beliefs, desires, and/or knowledge may be state-like in that awareness of X has genuine duration. For more on this widely ramifying point see Bennett and Hacker (2003).

statements that drives the association between caregivers' mind-related term use and children's social cognitive development. There is evidence that only explanatory uses of mind-related terms correlate with relevant child variables, while simple reference to story characters' mental states and/or epistemic properties do not (Slaughter, Peterson, & Mackintosh, 2007). There is also evidence that only mothers' use of mind-related terms in statements that accurately reflect the experience of their infant – i.e., their degree of *mind-mindedness* - is predictive of children's later understanding of the mind (Meins, Fernyhough, Wainwright, Das Gupta, Fradley, & Tuckey, 2002). Although operationalized as the proportion of appropriate mind-related comments, these authors define *mind-mindedness* as the "proclivity to treat ones infant as an individual with a mind rather than merely an entity with needs that must be met" (p. 1194). This raises the issue of parenting style more generally. Mothers' appropriate use of mind-related terms may be a marker of a more engaged and responsive parenting style, and that parenting style, rather than (or, along with) its appropriate-mind-related-term-use marker, may be what is associated with children's social-cognitive development. This interpretation is supported by evidence that parenting in a sensitive, cooperative, and explanatory manner is associated with children's advanced social cognitive development (Ruffman, Perner, & Parkin 1999; Pears & Moses, 2003), although findings are somewhat inconsistent (e.g., Hughes et al., 1999; Pears & Moses, 2003).

A key question concerns the relations among mothers' parenting styles, their mind-related term use, and children's understanding of the mind (Harris, 2006). The present study assesses the relative contributions of observationally-derived ratings of

maternal engagement,² mothers' use of mind-related language, and their three-to-five year old children's concurrent performance on false belief tasks and understanding of interpretation two and one-half years later.

Peterson and Slaughter (2003) found concurrent correlations between mothers' self-reported preferences for elaborated, explanatory talk about mental predicates and their children's performance on false belief tasks. They concluded that mothers' tendencies toward elaborated, explanatory talk about the mind is beneficial to children's social-cognitive development. However, Peterson, Slaughter, and Mackintosh (2007) subsequently argued that focus on the simple presence of mind-related terms may be misleading, as there is evidence that the manner in which such terms are used is an important variable. These authors assessed mother-child dialogue during the narration of a wordless picture-book, and found that of six categories of mind-related term use, only two types were associated with concurrent false belief understanding among children 38 to 57 months of age: (1) *cognitive clarifications*, statements that either (a) described what story characters were thinking or feeling, (b) explained relations between perceptual experiences and knowledge, or (c) involved contrast between different characters' thoughts and/or feeling or between discrepancies between beliefs and reality; and (2) *false belief endings*, comments which made explicit one character's ignorance of, or false belief about, the final situation of the story (e.g., "Mom doesn't know what happened while she was gone"). In contrast, simple mention of mind related terms (e.g., "He remembers," "the baby's happy") were not related to children's

² For stylistic reasons, 'mothers' parental engagement' and 'maternal engagement' are used synonymously in this report. To be clear, although the sample included only mother-child dyads, the aspects of mother's parental engagement assessed in the present study are equally applicable to male caregivers.

understanding of false belief. These results suggest that it is not mind-related terms per se, but their appearance in explanatory statements that is related to children's social cognitive development.

There is also evidence of longitudinal relations between mind-related talk and social cognitive development. Dunn et al. (1991) followed a sample of 50 families beginning when the children were 33 months old, assessing multiple aspects of family interaction as well as of parental discourse, including references to feeling states and causal talk involving mental terms (e.g., "You broke my glass and that made me sad") at Time 1. These authors found that mothers' references to feeling states and to causal relations involving mental terms were positively associated with children's performance on false belief tests roughly seven months later. However, with respect to observational ratings of parenting these authors did not find any significant correlations between mothers' responsiveness, attention, control or affection toward their children and their children's subsequent performance on false belief tasks.

In a study of same-sex twin pairs, Hughes et al. (1999) found that family SES, parents' affective expressions (both positive and negative), parental disciplinary style, and children's verbal IQ were concurrently associated with children's performance on a battery of false-belief and deception understanding tasks. The intensity of parents' positive and negative affect, the degree of positive (e.g., praise, reward, explanation) and negative (e.g., criticism, physical restraint) control, and of discipline severity were observationally rated. Regression analyses revealed that certain parental behaviours remained significantly correlated with children's performance on false-belief and deception understanding when controlling for child sex, family SES, and children's verbal

IQ. Unexpected sex differences were found: among girls, parental warmth was associated with advanced performance on social cognitive tasks while among boys, severity of discipline was associated with advanced performance. The positive association between more severe discipline and advanced false-belief understanding among boys is puzzling given that a conceptually similar variable of 'negative control' was significantly negatively associated with false-belief and deception understanding in the full, mixed-sex sample. However, as Hughes et al. (1999) note, individual differences in social cognitive development have been found to be associated with number of siblings (e.g., Perner, Ruffman, & Leekam, 1994; Lewis, Freeman, Kyriakidou, Maridaki-Kassotaki, & Berridge, 1996; Ruffman, Perner, Naito, Parkin, & Clements, 1998), and the presence of a same-aged sibling among twins may make this sample somewhat unusual, possibly limiting its generalizability.

Pears and Moses (2003) focused on parental disciplinary style and children's understanding of belief in a sample of 3-5 year olds. Parenting variables included power assertion, use of consequences (e.g., time out), general instruction about the effects of behaviour, and specific instruction about the effects of behaviours on others' feelings. Social cognitive tasks included visual perspective taking, desire reasoning (i.e., assessed children's understanding of how fulfilled and unfulfilled desires might affect a character's feelings), false belief tasks, emotion recognition, and affective perspective taking (puppets acted out scenes involving events that would typically provoke happiness, fear, sadness, or anger, e.g., getting an ice cream cone, seeing a big dog, being left out of an outing, or having a fight with a sibling, respectively). They statistically controlled for children's general cognitive ability by using scores derived from the BSID-II

(Bayley, 1993) for younger children and or the WPPSI-R (Wechsler, 1989) for older children.

Pears and Moses (2003) found a significant negative relation between parents' authoritarian disciplinary style and children's understanding of false beliefs. They noted that although an intuitive interpretation of these data is that power assertion has negative effects on children social cognitive development, the causal connection [if one exists at all] may run the other way. Parents may be more likely to use power assertive techniques with children who have less advanced understanding of the mind. Support for this interpretation includes the fact that power assertive discipline techniques (e.g., yelling, spanking) were negatively correlated with the child's age while age was positively correlated with false belief understanding. However, as Carpendale and Lewis (2006) point out, use of more positive parenting strategies (e.g., explanation) was not positively correlated with child age, suggesting that it is not the case that parents of older children use relatively less coercion and more explanation. Furthermore, power assertion was negatively associated with children's understanding of belief when age was controlled, inviting speculative parent-to-child inferences from these correlational data.

Rather than conceiving of parenting style and parental language as distinct variables, some researchers have conceptualized mothers' use of mind-related terms as an indicator of their parenting style. Meins et al. (2002) reported concurrent associations between observational assessments of maternal sensitivity and mothers' use of apparently accurate descriptions of their infants' mental states. Although both maternal sensitivity and mothers' appropriate mind-related comments were bivariately associated

with children's performance on a battery of social cognitive tasks 39-42 months later, regression analyses revealed that, with respect to parenting variables, mothers' appropriate mind-related comments were the best predictor of subsequent social cognitive understanding. Subsequently, Meins, Fernyhough, Wainright, Clark-Carter, Das Gupta, Fradley, and Tuckey (2003) conducted PATH analyses suggesting a direct effect of appropriate mind-related comments at six months on children's social cognitive performance at 48 months. However, their maternal sensitivity variable was not included in these analyses. Thus, the relative contributions of observationally assessed maternal sensitivity and mothers' appropriate mind-related comments to children's subsequent performance on social cognitive tasks in this data set is unknown.

If appropriate mind-related comments indicate the "proclivity to treat one's infant as an individual with a mind...", it is natural to wonder whether alternative, behavioural manifestations of such a proclivity are also related to children's social cognitive development (Meins et al., 2002, p. 1194). The positive association between appropriate mind-related comments and observational ratings of maternal sensitivity suggests that appropriate mind-related comments may predict children's social cognitive development because such comments are manifestations of sensitivity; accurate mind-related language may be a better marker of sensitive, attuned parenting than observational ratings of maternal sensitivity. Alternatively, there might be a specific relation between social cognitive development and linguistic manifestations of this proclivity that involve mind-related terms.

Recent research has focused on teasing apart the relative contributions of parenting style and parental language. Ruffman and colleagues (1999) found that

parents who reported that they would ask their child to reflect on the feelings of others in a disciplinary situation had children who were more advanced in false belief understanding. Following up on these findings, Ruffman et al. (2002) found evidence that mothers' use of mind-related terms plays a causal role in the development of children's understanding of the mind. However, Slaughter, Peterson, and Mackintosh (2007) point out that both the frequency of mothers' use of mind-related terms and the frequency of mothers' causal-explanatory talk of any kind—including but not limited to mentalistic topics—were found to be correlated with children's performance on social cognitive tasks, and argued that the importance of causal mind-related talk is only "tentatively indicated by these findings" (p. 840). Relatedly, Turnbull, Carpendale, & Racine (in press), found that only approximately half of the propositions that constituted a narrative involving deception and an unexpected transfer (i.e., situations involving false beliefs) involved mind-related terms. These authors dubbed these propositions the "false belief elements" of the story and found that the frequency with which false belief elements emerged during a mother-child picture book narration was associated with children's false belief understanding. In contrast, the simple presence of mind-related language in these dyads' co-narrations was not associated with children's performance on false belief tasks. These findings raise the question of whether associations between mothers' mind-related terms and children's social cognitive development obtain only (or mostly) because mind-related terms appear frequently in explanatory statements. In turn, a tendency to make explanatory statements in conversation with one's child might well be considered an alternative manifestation of mind-mindedness, as, by definition, to explain x to A is to treat A as a being with a mind.

As a partial response to this issue, Ruffman et al. (2002) performed an analysis concerning whether or not the simple presence of mind-related terms themselves accounts for relevant variance (see their Table 6, p. 744.) They found that, across three time points, only utterances including mind-related terms were predictive of subsequent social cognitive understanding. They interpreted this as evidence that “only mother mental state utterances have a unique causal role in facilitating” social cognitive development (2002, p. 744). However, as Harris (2005, p. 72) speculated, “The mother’s psychological sensitivity toward her child [may be] the main engine of the child’s mental state understanding. The mother’s tendency to discuss thoughts and feelings, especially those of storybook characters, might be an ineffective by-product of that sensitivity.” Ruffman, Slade, Devitt, and Crowe (2006) subsequently aimed to determine if the link between mothers’ mind-related language and children’s false belief performance is independent of mothers’ general parenting style. They found what they described as evidence of a “clear effect of mother mental state talk on theory of mind, and no effect for general parenting style” within a 3-4 year old period (p. 120). However, Ruffman et al. (2006) also note that for mothers in their sample, ratings on parenting style tended towards the optimal end of the scale (more so than in Dunn et al., 1991) and that (possible) effects for general parenting style may be stronger if less optimal parenting styles were better represented. Thus, Ruffman et al.’s conclusions may require qualification. As Harris (2006) notes it may be that subtle variations in mothers’ parenting style have no detectable effect on children’s social cognitive development while more gross differences in sensitivity and attunement do. Mothers’ mind-related language may have an effect only within a “good-enough parenting” environment, such as that found in Ruffman et al.’s sample.

The general question which emerges from a review of these studies is whether it is the mind-related words that mothers say or the way in which they say them that matters for children's developing understanding of the mind.³ Is it mothers' use of relevant mind-related terms in discussion with or about their child that matters, or do more molar, observationally derived variables better represent the relevant parenting phenomena? Alternatively, specifically linguistic and more broadly behavioral parenting variables may both be associated with children's social cognitive development. The relative contributions of observationally –derived parenting variables and mothers' use of mind-related language are the focus of the present research. I assessed mothers' degree of parental engagement and their use of mind-related language during conversation with their 3-5 years old children along with their children's concurrent false belief understanding. In a longitudinal follow up 2.5 years later, I further assessed their understanding of interpretation (Carpendale & Chandler, 1996), typically considered a more sophisticated aspect of understanding the mind.

³ An important caveat to conclusions drawn from the studies reviewed above comes from Vinden (2001) who found that, unlike European-American mothers, Korean-American mothers largely endorsed an authoritarian parenting style, and that Korean children displayed a more advanced understanding of the mind than their US counterparts, for whom authoritarian parenting was negatively associated with performance on social cognitive tasks. These results may suggest that the relationship between parenting style and social cognitive development is moderated by the parenting expectations and ideals of the cultural context. Limitations of generalizability are important to bear in mind.

Methods

Participants

An urban community sample of sixty-four mothers and their children (34 girls, 30 boys), ranging from 36 to 70 months of age ($M = 53$, $SD = 9$) participated in the study. Demographic information was available for 40 of the 64 participants: 86% percent of the children were Caucasian, 10% were Asian, and 4% were of African descent; 86% of the children came from two-parent families; 41% of the mothers had completed a university degree, 45% had attended a university or college, and the remainder had completed high school. In two-parent families, 37% of spouses had completed a university degree, 34% had attended a university or college, 27% had completed high school, and the remainder had completed elementary school. Thirty-two percent of the mothers were employed full-time, 51% were employed part-time, and the rest were unemployed. In two-parent families, 98% of spouses worked full-time and 2% worked part-time.

Time 2. At Time 2, roughly 30 months later, 45 (70%; 23 girls, 22 boys) of the original participant dyads agreed to return for a second visit ($M=82$, $SD = 8.9$, Range 61 - 98).

Design and Procedure: Time 1

Dyads were assessed in the lab or at home at the mother's convenience. There were no differences among study variables as a function of counterbalancing status.⁴ Twenty-four of the observational sessions (37.5%) were conducted in a university laboratory and 40 of the sessions (62.5%) were conducted in participants' homes. There were no differences in the measures as a function of where data were collected, as assessed by t-tests.

The order of the interaction tasks and the assessment of false belief understanding were counterbalanced for approximately half of the period of data collection; for the second half of the data collection the interaction tasks were presented before false belief understanding was assessed. Counterbalancing was discontinued because we were not always able to assess false belief understanding without the presence of the mother. We grew concerned that when false belief understanding was assessed before the interaction task, mothers might realize or be otherwise influenced by the purpose of the study and subsequently become uncharacteristically focused on the (imaginary) thoughts and feelings of the dolls in the doll house task. There were no differences among study variables as a function of counterbalancing status.

⁴ The results of the t-tests (equal variances not assumed, two-tailed significance tests) are as follows: (1) authoritative control: counterbalanced ($n = 34$), $M = 4.71$, $SD = 1.382$; interaction tasks first ($n = 30$), $M = 4.93$, $SD = 1.486$; $t = -.619$, $p = .538$; (2) general responsiveness: counterbalanced, $M = 4.68$, $SD = 1.788$; interaction tasks first, $M = 4.93$, $SD = 1.831$; $t = -.556$, $p = .580$; (3) parental involvement: counterbalanced, $M = 5.71$, $SD = 1.194$; interaction tasks first, $M = 5.41$, $SD = 1.743$; $t = .763$, $p = .449$; (4) false belief understanding: counterbalanced, $M = 1.37$, $SD = 1.362$; interaction tasks first, $M = 1.72$, $SD = 1.066$; $t = -1.212$, $p = .230$; (5) Time 2 interpretation understanding: counterbalanced ($n = 24$), $M = 2.46$, $SD = 1.693$; interaction tasks first ($n = 24$), $M = 2.79$, $SD = 1.841$; $t = -.653$, $p = .517$.

Interaction Task 1: Dollhouse Task

Mother-child dyads were videotaped while acting out events with dolls and a dollhouse. The task, adapted from Cervantes and Callahan (1998) involved mother-child dyads making up a story including four pre-scripted elements (the parents leave the children with a babysitter overnight, the children get in a fight and the babysitter intervenes, a child's favourite toy is lost, and mom's favourite dish is broken). I reasoned that this task would present mothers with an opportunity for discussion of characters' thoughts and feelings, and thus present the investigator with an opportunity to assess mothers' tendency to use mind-related language.

Interaction Task 2: Storybook Task

Dyads were asked to make up a story based on a text-free picture book depicting two children in situations involving unexpected transfers and deception. Briefly, the primary story protagonists, Sara and Billy are given chocolate bars by their mother. Sara immediately makes a mess eating her chocolate bar while Billy saves his for later by hiding the chocolate bar under a sleeping dog. Sara sees him hide the chocolate, unbeknownst to Billy, and while he is outside playing she takes his chocolate and puts it in her pocket. When Billy returns, he looks for his chocolate under the dog while Sara laughs. Billy becomes angry and pushes Sara, causing the chocolate bar to fall out of her pocket. Their mother intervenes at this point and the conflict between the children is resolved. Although all parent-child dyads talked about the same sequence of 17 drawings, there was no constraint on how the participants talked about storybook events. This procedure was used as another opportunity for discussion of events involving beliefs, thoughts, feelings, etc.

Parental Engagement

Video recordings of the dollhouse task were coded using an adaptation of the parental engagement scale (Johnston, 2004; see also Johnston, Murray, Hinshaw, Pelham, & Hoza, 2002). This coding system was developed for use with clinical samples (ADHD-diagnosed boys and their mothers). Because the present study made use of a community sample and had different hypotheses, the scale required modification. Specifically, three of the original six dimensions of the scale were used. *Authoritative control* represents the degree to which the parent is authoritative vs. autocratic. The authoritative parent offers rationales for commands and attempts to elicit cooperation rather than exert control coercively. *General responsiveness* represents the degree to which parents' behaviour is guided by their children's activity; for example, low ratings would result from a parent asking questions when the child is trying to concentrate. With a very active child, high ratings would result from a parent responding to her child's contribution to the play and low ratings would be rendered to a parent who attempted to direct the play. With a more inhibited child, high ratings would result from a parent's attempt to involve her child in the play and low ratings would be rendered to a parent who acted out the four pre-scripted elements on her own. *Parental involvement* represents the degree to which parents appear interested in the interaction, including the amount of time spent sharing attention with the child. For example, low ratings would result from a parent appearing bored, or preoccupied, and high ratings would result from a parent sitting in close proximity, appearing interested in the interaction.

Three of the dimensions included in Johnston's parental engagement scale were not used. The dimension of 'sensitivity of parental control' (the degree to which the parent directs the child's behaviour in a manner that is sensitive to the needs and

abilities of the child) was not used in the present analysis because our tasks did not require that mothers play a strongly directive role. The dimensions of *parental affective tone* (degree of positive or negative affect) and *parental acceptance of the child* (extent to which parent accepts, and is affectionate towards the child) were also not used in the present analysis. Exploratory visual inspection of the video data suggested that it contained little variability along these dimensions. No mother in our self-selected community sample appeared overtly rejecting towards or angry with her child. Furthermore, I grew concerned that in initial attempts to rate these dimensions, those ratings reflected global personality characteristics of mothers rather than aspects of their parenting style per se; for example, some mothers were more emotionally expressive than others, and variations in effusiveness/ emotional reservation were not germane to the present study, which focuses mother-child interaction style.

The dimensions of authoritative control, general responsiveness, and parental involvement were conceptualized as different aspects of a somewhat heterogeneous concept of parental engagement, rather than as components of a single latent variable. Although I expected (and found) a high degree of intercorrelations among these three dimensions, I did not composite these scores to yield an overall parental engagement rating. Given that these dimensions are logically distinct (i.e., distinct in meaning) I assume that compositing is not justified. For example, the behaviour of a mother rated as 7 on involvement, as 1 on authoritativeness, and 4 on responsiveness would not be well represented by a moderate overall parental engagement score (using either a weighted or unweighted composite). Although this approach differs from Johnson et al. (2002), with respect to assumptions and method, these conclusions are consistent with their extraction of two principal components, which they labelled

Responsiveness, and Involvement, respectively. In this report I assume that empirical questions regarding the distribution of behavioural tendencies in a particular sample are distinct from logical questions regarding the criteria by which rating dimensions are operationally defined, so I do not interpret a high degree of intercorrelations among the three parenting scales used in the present study as indicating that they each assess a common underlying latent variable (for more on this point see Maraun & Peters, in press; Maraun, 1998).

For each parental engagement dimension, coders followed Johnston (2004) in beginning with a neutral rating of "4" in mind (range = 1-7). A research assistant, blind to the hypotheses coded 18 (28%) of the videotapes for the purposes of interrater reliability analysis. Interrater agreement was assessed by computing an intraclass correlation coefficient of absolute agreement (ICCA), mathematically equivalent to a squared, weighted kappa (disagreements of larger magnitude result in larger penalties). Reliability results were as follows: for ratings of authoritative control, ICCA = .89, (95% CI: .73-.96), for general responsiveness ICCA = .91 (95% CI: .77-.96) and for parental involvement ICCA = .89 (95% CI: .74-.96). Twenty-nine of 54 data points involved perfect agreement (54%), Twenty-two of 54 involved disagreements of one point (41%), and two of 54 involved a disagreement of two points (4%). All cases of disagreement were resolved by discussion between the author and the research assistant.

Mind-related Terms

A research assistant blind to the hypotheses coded transcripts of the storybook and dollhouse tasks for mind-related terms using criteria derived from and consistent with the norms of the field (e.g., Bartsch & Wellman, 1995; Bretherton & Beeghly, 1982;

Cervantes & Callanan 1998; Dunn, Bretherton & Munn 1987; Moore, Furrow, Chiasson, & Patriquin, 1994; Ruffman, Slade, & Crowe, 2002). The following terms (and variants thereof), used by one or more dyads, were coded as mind-related terms: Want, hope, wish, think, know, believe, expect, wonder, care about, pretend, make sense of, suppose, prefer, remember, understand, forget, remind, realize, consider, have in mind, imagine, decide, curious about, happy, unhappy, sad, angry, frightened, mad, upset, disappointed, worried, surprised, pleased, excited, interested, frustrated, annoyed, hate, dislike, enjoy, glad, feel good, feel bad, like, and love. So-called conversational uses of mind-related terms (e.g., "I don't know," "What do you think?") were also coded (cf. Moore et al., 1994).

False Belief Tasks

False belief understanding was assessed using the unexpected transfer (Wimmer & Perner, 1983) and unexpected contents paradigms (e.g., Gopnik & Astington, 1988). In the unexpected transfer task, children were shown a puppet (Maxi) leaving a toy in one of two buckets and then going outside to play. While Maxi plays outside, a second puppet moves the toy to a different location. Upon Maxi's return, children were told that he is about to look for the toy and were asked, "Where will Maxi look for the toy?" and "Why do you think Maxi will look there?" In the unexpected contents task, children were shown a Smarties box (a candy well known to Canadian children), and asked "What do you think is inside this box?" After invariably answering "Smarties" or "candies" they were shown that the box actually contained crayons. Children were then told that a puppet named Mary has not seen inside the box and asked, "What would Mary think is inside the box?"

On the unexpected transfer task, children were awarded one point for correctly predicting where Maxi would look for the toy and another for correctly explaining why Maxi would look there. Answers based solely on desire were considered incorrect (e.g., "Because he wants the toy."). Children who responded incorrectly on the prediction question were told where Maxi would actually look and were then asked the explanation question. Therefore, it was possible for children to fail the prediction question but, once corrected, go on to explain correctly that Maxi would look in that location because that is where he left it and/or because he did not see it being moved.

On the unexpected contents task, after children had confirmed that they thought the box contained Smarties (or candies) they were given a point for correctly predicting that the puppet would think the box contained Smarties or candies. This results in a possible maximum score of three. Compositing these three tasks is justified because they are not logically distinct; each assesses children's understanding of false beliefs, and a child who passes two and fails one is well-characterized as having a less developed understanding of false beliefs than the child who passes all three.

Design and Procedure: Time 2

Understanding of Interpretation

Children's understanding of interpretation was assessed using procedures developed by Carpendale and Chandler (1996).

Ambiguous Figure

Children were shown an ambiguous line drawing, Jastrow's "duck-rabbit" (Attneave, 1974), and observed a research assistant showing the drawing to two

puppets, Mary and Maxi. First, one puppet was introduced and asked "what do you think this is?" To which he/she responded "I think that it's a duck." Then, the other puppet, was asked the same question to which he/she said, "I think it's a rabbit" (the order of presentation of the puppets was counterbalanced).

After ensuring that the children were able to see both aspects of the drawing, children were asked an explanation question, "Why does Mary say it is one thing while Maxi says it is another?" Responses were scored as failures if they contained no relevant or coherent explanation, such as claiming that neither interpretation makes sense, or that one interpretation must be right and the other wrong. Passes involved recognition that it is sensible for Mary and Maxi to see different aspects of the drawing and reference to the ambiguous nature of the stimulus (e.g., "It looks like both").

Children who agreed that it makes sense for Mary and Maxi to see different aspects of the drawing, but whose explanation made reference to characteristics of the puppets (e.g., "Maxi has a pet rabbit") rather than the ambiguous nature of the stimuli were scored as failing.

Next, children were asked a prediction question. Failures involved confident predictions about what another puppet would see. Responses were scored as passes if they involved a prediction in which the child expressed little or no confidence and: (a) they justified this response by reference to the stimulus (e.g., "It looks more like a rabbit because ducks don't have that bump on their head") or (b) they explained that they were just guessing (e.g., "Well I don't have her brain!"). Children who refused to make a prediction or who expressed little or no confidence in their prediction but were not able to explain why were scored as failing on this task. For all three aspects of interpretation

understanding, it was possible for children to fail the explanation question but to pass the subsequent prediction question, and vice-versa.

Referential Ambiguity

Children were asked to close their eyes while a research assistant hid a sticker under one of three cards, one featuring a picture of a large blue block, a second with a picture of a large red block on top, and the third featuring a picture of a small red block. Children then observed the research assistant asking the puppets Mary and Maxi where they thought the sticker is located after being told "It's under the big block" (the sticker was always placed under one of the two cards featuring pictures of big blocks). Next, either Mary or Maxi (order counterbalanced) said "I think it's under the big red block" while the second puppet chose the other large-block location.

Responses were scored as passing an explanation question if the child stated or implied that both Mary and Maxi's statements were reasonable because both chose locations consistent with what they had been told (e.g., "Well, they're both big blocks"). Responses justifying Mary and Maxi's divergent interpretations by reference to presumed characteristics of the puppets (e.g., "Mary likes red") rather than by reference to the ambiguous nature of the statement were considered failures.

Next, a prediction question was asked: "If we gave another puppet, Ann, the same hint, would she think that the sticker is under the red block, the blue block, or would you not know what she would think?" (the order of the alternatives was counterbalanced). Passing involved refusing to make a prediction or making a prediction in which the child expressed little or no confidence, provided that she

explained that no confident prediction could be made, as two locations (under the big red or big blue blocks) were equally consistent with what they had been told.

Lexical Ambiguity

Children observed a research assistant instructing two puppets, Mary and Maxi to "Wait here for a ring." Next, the research assistant asked the puppets what they were waiting for. Either Mary or Maxi (counterbalanced) responded "I'm waiting for a ring for my finger" as he/she showed the child a picture of a ring. Next, either Mary or Maxi was asked the same question, to which he/she responded "I'm waiting for the telephone to ring" as the puppet showed children a picture of a telephone. Children were then asked, "We told Mary and Maxi to wait here for a ring, so it is silly for Mary to say she's waiting for one thing while Maxi says something different?" Passes involved explanation that both interpretations of the command were sensible (e.g., "It's a homonym!", "Well, they're both rings."), Children were awarded another point if they refused to predict how another puppet [Joseph or Ann, counterbalanced] would interpret the command to "wait for a ring," or made a prediction in which they expressed little or no confidence (e.g., "Well, I think he'd probably think it was a telephone but I'm not really sure.")

Within each interpretation task, the explanation questions preceded prediction questions, but the order of the three tasks was counterbalanced. Passes and failures, respectively, were coded as 1s and 0s and were summed to form an unweighted composite with a possible range of 0-6. A research assistant blind to the goals of the study coded 24 (56%) of the tapes. Over 144 data points, Cohen's kappa was .80 (91% agreement). In cases of disagreement, the authors' codes were used in the analysis.

Results

Descriptive Statistics for All Study Variables

Table 1 contains descriptive statistics for all variables. Mothers tended to be more authoritative, responsive, and involved than not, as the distribution of scores on all three dimensions is skewed to the right. The median value of the authoritative control

Table 1.

Descriptive Statistics for All Study Variables

Variables	M	SD	Range
Child Age			
Time 1	52.57	9.26	36.4–69.9
Time 2	81.86	8.85	61.6–98.4
False Belief Understanding	1.50	1.16	0–3
Interpretation Understanding	2.58	1.75	0–6
Mind- Related Terms	67.33	27.22	22–137
Authoritative Control	4.59	1.565	1–7
General Responsiveness	4.58	1.913	1–7
Parental Involvement	5.51	1.587	1–7

variable was 5, whereas that of the general responsiveness and parental involvement variables were 6 (all values out of 7). These results are likely due to a self-selection sampling bias; more engaged mothers may be more likely to volunteer to participate in

studies of mother-child interaction. Additionally, there were no significant differences in any study variables as a function of child sex as assessed by t-tests.⁵

Zero-order Correlations Among All Study Variables

Table 2 presents zero-order correlations among all predictor variables. No predictor variables were significantly associated with child age at Time 1 or Time 2. At the zero-order level, Time 1 false belief understanding was significantly associated with child age at Time 1 ($r=.635, p<.01$), as expected, but, surprisingly, children's understanding of interpretation was not correlated with age at Time 2 ($r=.198, p>.05, ns$). At the zero order level, Time 1 false belief understanding was not predictive of children's understanding of interpretation at Time 2 ($r=.17, p=.24, ns$). When controlling for ages at Time 1 and 2, the correlation remained nonsignificant ($r =.10, p=.517, ns$).

Significant positive intercorrelations were found among the parental engagement variables. Mothers' authoritative control was found to be associated with their general responsiveness ($r =.641, p<.000$) and with their parental involvement ($r= .389, p=.001$). General responsiveness was significantly associated with their parental involvement as well ($r = .623, p<.000$). Employing a sequential Bonferroni method of correction for multiple comparisons (Holm, 1979), all associations remain statistically significant (all

⁵ The results of the t-tests (equal variances not assumed, two-tailed significance tests) are as follows: (1) authoritative control: for girls ($n = 34$), $M = 4.88$, $SD = 1.431$; for boys ($n = 30$), $M = 4.72$, $SD = 1.437$; $t = .437, p = .664$; (2) general responsiveness: for girls, $M = 4.74$, $SD = 1.943$; for boys, $M = 4.86$, $SD = 1.642$; $t = -.281, p = .780$; (3) parental involvement: for girls, $M = 5.38$, $SD = 1.688$; for boys, $M = 5.79$, $SD = 1.146$; $t = -1.143, p = .258$; (4) false belief understanding: for girls, $M = 1.62$, $SD = 1.155$; for boys, $M = 1.43$, $SD = 1.223$; $t = .618, p = .539$; (5) interpretation understanding: for girls ($n = 24$), $M = 2.71$, $SD = 1.628$; for boys ($n = 24$), $M = 2.54$, $SD = 1.911$; $t = .325, p = .746$.

references to correcting for multiple comparisons reported below utilize this sequential procedure).

Table 2.

Zero-order Correlations Among Study Variables

	A1	A2	FB	IU	MRT	AC	GR
Age Time 2	.799**						
FB	.635**	.518**					
IU	.182	.198	.170				
MRT	-.127	-.116	.073	-.136			
AC	-.007	-.055	.255*	.359*	.404**		
GR	-.132	-.184	.206	.267	.448**	.641**	
PI	-.144	-.096	.123	.349*	.338**	.389**	.623*

Note. A1= age at Time 1
 A2= age at Time 2
 FB= false belief understanding
 IU – interpretation understanding
 MRT = mind-related terms use
 AC = Authoritative Control
 GR = General Responsiveness
 PI = Parental Involvement.

** Correlation is significant at the 0.01 level (2-tailed),

* Correlation is significant at the 0.05 level (2-tailed).

Each dimension of the Parental Engagement scale was significantly positively associated with mothers' use of mind-related terms, controlling for multiple comparisons. Mothers' use of mind-related terms was positively associated with their degree of authoritative control ($r = .404, p < .001$), their general responsiveness ($r = .448, p < .000$), and with their degree of parental involvement ($r = .338, p = .006$).

Partial Correlations Among Time 1 Variables

Table 3 contains partial correlations between Time 1 predictor variables and children's false belief performance, controlling for child age. All three parental engagement variables as well as mothers' use of mind-related terms were found to be positively associated with children's concurrent false belief performance, controlling for multiple comparisons (authoritative control: $r=.386$, $p=.001$; general responsiveness: $r = .383$, $p=.001$; parental involvement: $r=.310$, $p=.008$; mind-related terms: $r=.261$, $p=.021$).

Table 3.
Partial Correlations Between Time 1 Predictor Variables and Children's False Belief Performance at Time 1, Controlling for Child Age (n=64)

	<i>r</i>	<i>p</i>
Authoritative Control	.386	.001
General Responsiveness	.383	.001
Parental Involvement	.310	.008
Mind-Related Terms	.261	.021

Longitudinal Relations

Table 4 displays partial correlations among Time 1 parenting variables and children's understanding of interpretation at Time 2, controlling for child age and Time 1 false belief understanding. Mothers' parental involvement ($r=.378$, $p = .006$), authoritative control ($r=.364$, $p=.008$), and general responsiveness ($r=.297$, $p=.025$) at Time 1 were significantly associated with children's interpretation understanding at Time 2, controlling for multiple comparisons. The correlation between mothers' use of mind-related terms at Time 1 and children's Time 2 understanding of interpretation was in the expected direction, but non-significant ($r=.103$, $p=.252$, ns). Because mothers' use of

mind-related terms was also positively associated with each of the three parental engagement variables, the associations between Time 1 parental engagement variables and children's Time 2 understanding of interpretation were examined controlling for mothers' use of mind-related terms: parental involvement ($r=.375, p = .007$); authoritative control ($r=.352, p=.010$), and general responsiveness ($r=.281, p=.034$). These associations remain significant after controlling for multiple comparisons.

Table 4.

Partial Correlations Coefficients Between Time 1 Predictor Variables and Understanding of Interpretation at Time 2, Controlling for Time 1 False Belief Understanding and Time 2 Age (n=45)

	<i>r</i>	<i>p</i>
Parental Involvement	.378	.006
Authoritative Control	.364	.008
General Responsiveness	.297	.025
Mind-Related Terms	.103	.252 (<i>ns</i>)

Regression Analyses

A series of regression analyses were conducted to assess the relative contributions of the observationally-derived parental engagement variables and mind-related language variables to children's social understanding. Table 5 summarizes the results of predicting false belief understanding from (step 1) child age, (step 2) mothers' mind-related terms, and (step 3) the parental engagement variables. Adding mothers' mind-related comments to the model accounted for roughly 4.5% of the variance in children's false belief performance beyond that accounted for by child age alone. As a block, the three parental engagement variables accounted for 8% of the variance in false

belief understanding beyond that accounted for by child age and mothers' mind-related term use. The effect sizes are small, but both are significant. Table 6 presents results of an analysis which reverses the order of the last two steps. The parental engagement variables account for roughly 12% of the variance in children's false belief understanding beyond that explained by child age alone. Adding the mind-related language variable to the model did not account for a significant amount of variance beyond that accounted for by child age and the parental engagement variables.

Table 5.

Predicting False Belief Understanding from Age, Mothers' Mind-Related Term Use, and Parental Engagement Variables

Model	R²	Adjusted R²	R² Change	F Change df1(df2)	Sig. F Change
1	.406	.396	.406	40.267(1, 61)	.000
2	.450	.431	.044	4.650(1, 60)	.035
3	.532	.489	.082	3.205(3, 57)	.030

Note. Model 1: child age;
 Model 2: child age, mothers mind-related term use;
 Model 3: child age, mothers' mind-related term use, parental involvement, authoritative control, general responsiveness.

With respect to longitudinal relations, we found that when controlling for child age, their false belief understanding at Time 1, and mothers' use of mind-related terms at time 1, mothers' parental engagement at Time 1 accounted for roughly 20% of the variance in children's interpretation understanding at Time 2 (see Table 7).

Table 6.***Predicting False Belief Understanding from Age, Parental Engagement Variables, and Mothers' Mind-Related Term Use***

Model	R²	Adjusted R²	R² Change	F Change df1(df2)	Sig. F Change
1	.406	.396	.406	40.267(1,61)	.000
2	.529	.496	.123	4.896(3, 58)	.004
3	.532	.489	.003	.294(1, 57)	.590

Note. Model 1: child age;
 Model 2: child age; parental involvement, authoritative control, general responsiveness;
 Model 3: child age; parental involvement, authoritative control, general responsiveness; mothers' mind-related term use.

Table 7.***Summary of Regression Analyses Predicting Children's Understanding of Interpretation at 81-months***

Model	R²	Adjusted R²	R² Change	F Change df1(df2)	Sig. F Change
1	.060	-.007	.060	.898 (3,41)	.450
2	.264	.151	.204	3.595 (3, 38)	.022

Note. Model 1: child age, false belief understanding, mind-related term use at Time 1;
 Model 2: child age, Time 1 false belief understanding, mothers mind-related term use; authoritative control, parental involvement, general responsiveness.

Range Restricted Data Set

For the purposes of comparing our results with those of Ruffman et al. (2006), which involved a greater restriction of range for parenting variables (skewed toward the optimal end of the scale) than the present study, an informal post-hoc investigation of the effects of such a range restriction in our sample was conducted. This involved excluding all cases with ratings of 2 or less on any of the three parental engagement

dimensions (range restricted sample, $n = 39$). Artificially restricting these data led to a different pattern of results (authoritative control x false belief understanding: $r = .232$, $p = .159$; general responsiveness x false belief understanding: $r = .170$, $p = .310$; parental involvement x false belief understanding: $r = .200$, $p = .230$; mind-related terms x false belief understanding: $r = .253$, $p = .130$; all controlling for child age) in which all associations were reduced to nonsignificance. Eliminating roughly the lowest one-third (39%) of cases with respect to ratings of parental engagement reduced the magnitude of the parenting variables positive association with concurrent false belief understanding. The range restriction had little effect on the magnitude of correlation between mothers' mind-related term use (MRT) and children's false belief understanding (FB) (full sample: $r = .261$, $p = .021$; range restricted sample: $r = .253$, $p = .130$), although, with fewer participants, confidence in the accuracy of the results is diminished, as reflected by higher p-value for the MRT x FB correlation.

With respect to longitudinal relations using the range-restricted data set, we found that, controlling for Time 2 age and Time 1 false belief understanding, general responsiveness ($r = .470$, $p = .004$), parental involvement ($r = .379$, $p = .025$), and mothers' use of mind-related terms ($r = .378$, $p = .025$), remained significantly associated with children's interpretation understanding at Time 2. However, the associations with parental involvement and mothers' mind-related terms, respectively, do not remain significant when correcting for multiple comparisons (authoritative control x interpretation understanding, $r = .155$, $p = .380$, ns). Eliminating cases involving ratings of 2 or lower on any parental engagement variable had the effect of increasing the magnitude of correlation between Time 1 mind-related terms use and Time 2 interpretation understanding (full sample: $r = .103$, $p = .252$; range restricted sample: $r = .378$, $p = .025$).

Discussion

Is it the mind-related words that mothers use or the way in which they say them that matters for children's developing understanding of the mind? The results of this study suggest that both are important and that optimality along one dimension tends to be accompanied by that in the other. Mothers' use of mind-related terms was associated with each of the three parental engagement variables. In short, these data suggest that a type exists—the engaged, mind-related-term-using mother. This is consistent with Meins et al.'s (2002) findings of positive associations between observational ratings of maternal sensitivity and mothers' appropriate mind-related term use, and that each of those variables predicted children's later performance on social cognitive tasks (although appropriate mind-related comments were found to be the better predictor of later social cognitive performance).

Although these data suggest the co-occurrence of engaged parenting and mind-related term use, the regression analyses shed light on the relative associations between parental engagement and mind-related term use, respectively, in this data set. The parental engagement variables explained a significant amount of variance beyond that accounted for by child age and mind-related term use. However, mind-related term use did not explain a significant amount of variance beyond that accounted for by child age and parental engagement. This provides tentative support for the conclusion that the parenting styles that accompany the use of mind-related terms drive found associations between mothers' use of such terms and children's false belief understanding.

Inferring that mothers' degree of parental engagement and/or use of mind-related terms have causal effects on children's false belief understanding is intuitively appealing. However, it may be that children who are relatively advanced in their understanding of the mind elicit more engaged parenting and more mind-related terms in conversation with their mothers. But the fact that children's false belief understanding was positively associated with child age, although neither any parental engagement variable nor mothers' mind related term use were lends support to the intuitive causal speculation. If children with advanced false belief understanding elicit more engaged parenting and more mind-related term use during interactions with their mothers, then we would expect positive associations between child age and mind related term use, and between child age and parental engagement ratings, respectively, neither of which were found.

In contrast to previous findings (Carpendale & Chandler, 1996; Lalonde & Chandler, 2002) children's understanding of interpretation was not bivariately associated with age in this sample. These results may suggest that children's understanding of interpretation unfolds along a different and less predictable path than do other aspects of understanding the mind, such as false belief understanding, which, consistent with other results (Wellman & Cross, 2001; Ruffman et al., 2006), was found to be highly correlated with age. Consistent with this interpretation, children's Time 1 false belief understanding did not predict their Time 2 understanding of interpretation, either at the zero-order level or when controlling for ages at Time 1 and 2. The longitudinal association between parental engagement variables at Time 1 and children's understanding of interpretation roughly two and one-half years later may indicate that children's understanding of interpretation is more sensitive to variations in parenting experience than are other aspects of social cognitive development. Although almost

every child may gain experience with false beliefs by the age of four-and-one-half, perhaps it is mostly children of more engaged parents who gain experience with more subtle aspects of epistemic relations, such as that two different beliefs about the same ambiguous stimulus can be equally correct.

With respect to longitudinal associations, controlling for Time 2 age and Time 1 false belief understanding, we found that all three Time 1 parental engagement variables were positively associated with children's understanding of interpretation at Time 2, but that mothers' use of mind-related terms was not, although the correlation was in the expected direction. This finding of no association between mothers' use of mind-related terms and children's performance on a social cognitive task may appear inconsistent with other results in the field (Dunn et al., 1991; Ruffman et al., 2002, 2006). However, this sample was considerably older at Time 2 than otherwise comparable studies (mean age at Time 2 was roughly 6 years and 7 months). These apparently disparate results may suggest that mothers' use of mind-related terms has a causal effect on the development of certain aspects of understanding the mind (i.e., false belief understanding) but not on others, such as interpretation understanding. Alternatively, it may be that attempts to tease apart the relations among parental language, parenting behaviours, and children's social cognitive development have been complicated by sample biases and other psychometric difficulties. Although more data would help here, comparison between, for example, the general responsiveness variable used in the present study and the 'responsiveness' variables in Ruffman et al. (2006) and Dunn et al. (1991) must be done cautiously. As is customary, these authors provide only minimal information about the criteria by which parenting ratings were rendered. Further, all rating scales involve arbitrary metrics, so for example, it is not clear that the midpoint of

one study's responsiveness scale corresponds to the midpoint of another's (Blanton & Jaccard, 2006). I tried to address some of these concerns by artificially range-restricting our sample and re-analyzing the data.

Ruffman et al. (2006) note that ratings of parenting style tended towards the optimal end of the scale in their sample, and that possible effects for general parenting style may be stronger if less optimal parenting styles were better represented. Although our parental engagement ratings were similarly positively skewed, their respective ranges did cover the entire 1-7 scales. In contrast, Ruffman et al.'s (2006) variables of mother responsiveness, social skill, control level ranged from 4-8 while mothers teaching ranged from 2-8 (all assessed on an 11-point, 0-10 scale). Assuming only that those mothers rated lowest on the parental engagement variables were indeed the least involved, responsive, and authoritative in *our* sample, our post-hoc analysis involving an artificial range restriction of these parental engagement variables sheds some light on this issue. Excluding all cases involving ratings 2 or less on any Parental Engagement dimension (range restricted sample, $n = 39$), we found a somewhat different pattern of results than those obtained when using the full sample. Eliminating cases involving the lowest ratings on parental engagement variables reduced the magnitude of those variables' positive association with concurrent false belief understanding. However, the association between mothers' mind-related term use and children's false belief was only slightly affected by the artificial range restriction. This suggests that the association between mind-related terms and false belief understanding in the full sample was driven largely by the most engaged mothers.

With respect to longitudinal relations, the artificial range restriction had the effect of increasing, roughly tripling, the magnitude of correlation between mothers' mind-related term use and children's interpretation understanding 30 months later. These results are consistent with Ruffman et al.'s (2006) finding that, with a sample of relatively responsive and socially skilled mothers, mind-related term use, but not parenting variables, predicted children's subsequent social cognitive development. Taken together, these results suggest that associations between mothers' mind-related term use and children's performance on social cognitive tasks are driven largely by mothers who tend toward the optimal end of the parenting scales. In other words, given an engaged-enough parenting environment, use of mind-related terms appears to have a beneficial effect on children social cognitive development.

An important limitation to the current study is that it included no assessment of children's verbal ability. Children's performance on false belief tests is widely found to be associated with their verbal ability (e.g., Astington & Jenkins, 1999) and given its task demands, it is likely that children's verbal fluency would positively correlate with performance on our assessment of interpretation understanding. The present study is unable to determine if parental engagement has a specific effect on children's understanding of interpretation or a more general effect positive on their verbal ability that manifests in their understanding of interpretation. Distinguishing between these alternatives is a task for future research.

In conclusion, this study suggests that more engaged parenting tends to be accompanied by greater use of mind-related terms. These results also suggest that range-restriction of parenting variables may lead researchers to underestimate the

association between parenting style and social cognitive development and to overestimate the importance of mind-related language. Finally, the present results suggest that more engaged parenting is concurrently associated with and predictive of children's social cognitive development.

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