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Explaining the Relation between Early Mind-Mindedness and Children's Mentalizing Abilities: The
Development of an Observational Preschool Assessment

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Abstract

The aim of this research was to develop a new observation-based measure for assessing caregivers' mind-mindedness in the preschool years and investigate whether this measure could explain the link between mothers' early appropriate mind-related comments and children's later mentalizing abilities. The new measure was developed using a sample of mothers and 44-month-olds ($N=171$), characterizing mind-mindedness in terms of (a) solicited child involvement, (b) adaptive communication, and (c) internal state talk. These indices were positively related to established assessments of mind-mindedness at 8, 44, and 61 months. Positive associations were also observed with children's later mentalizing abilities. The new measure of mind-mindedness did not, however, mediate the relation between mind-mindedness in the first year of life and children's mentalizing abilities.

Key words: theory of mind; emotion understanding; mind-mindedness; longitudinal

Explaining the Relation between Early Mind-Mindedness and Children's Mentalizing Abilities: The Development of an Observational Preschool Assessment

The construct of *mind-mindedness* (Meins, 1997) has been demonstrated to relate to important social and cognitive developmental outcomes in the preschool years and beyond (see McMahon & Bernier, 2017, for a review). Mind-mindedness is defined as caregivers' tendency to treat their young children as individuals with minds of their own, and has been operationalized in a number of different ways. In the first year of life, mind-mindedness is assessed from caregivers' comments on their infants' internal states during infant-caregiver interaction. Appropriate mind-related comments index accurate interpretations of the infant's thoughts or feelings (e.g., saying that the infant wants the ball if she reaches toward it, or likes the toy monkey if he smiles when he sees it), whereas non-attuned mind-related comments indicate that the caregiver has misread the infant's internal state (e.g., saying that the infant is bored with the rings when he is still actively involved in playing with them, or wants to read the book when she is already engaged with playing with the ball). Mind-mindedness is associated with high levels of appropriate comments and/or low levels of non-attuned comments (Meins et al., 2012; Meins, Fernyhough, Fradley, & Tuckey, 2001). At the end of infancy, mind-mindedness has been measured in terms of caregivers' tendency to attribute meaning to their infants' early non-word vocalizations (Meins, 1998). Finally, mind-mindedness from the preschool years onwards can be indexed by caregivers' tendency spontaneously to focus on mental and emotional attributes when describing their children (Meins, Fernyhough, Russell, & Clark-Carter, 1998).

Different measures of mind-mindedness are employed at different ages in order to accommodate the advancing physical and mental abilities of the child. For example, observational measures of appropriate versus non-attuned mind-related comments to index mind-mindedness are unlikely to be age-appropriate beyond infancy. As children's verbal expertise develops, they will be

increasingly able to communicate their thoughts and feelings, making their internal states less opaque, and correspondingly reducing differences in parents' ability to interpret them. In a similar vein, children's increasingly sophisticated motor skills enable them to signal preference through orientation towards specific play items, resulting in less need for caregivers to interpret what the infant likes or wants. For these reasons, assessing mind-mindedness in terms of the appropriateness of internal state attributions about the child is considered less valid beyond infancy, with the describe-your-child measure recommended for indexing mind-mindedness from the preschool years onwards (Meins & Fernyhough, 2015).

One disadvantage of the description measure compared with the observational infant measure is that it is not possible to assess the extent to which parents' descriptions of their children are congruent with those children's actual internal states. For example, if a caregiver describes their child with reference to their favorite book or TV program, how they adore their brother or hate their sister, or how imaginative or creative they are, it is very difficult in the course of typical developmental research to verify the appropriateness of such mind-minded descriptions. Moreover, the describe-your-child measure can be administered remotely via an online questionnaire (e.g., Fishburn et al., 2017) in the absence of any face-to-face contact with either the caregiver or the child. This measure thus assesses mind-mindedness purely in terms of the extent to which caregivers mention mental and emotional characteristics when describing their children, rather than attempting to establish the appropriateness or veridicality of such descriptions. This is noteworthy because the appropriateness of mind-related comments in infancy has been shown to be critical in understanding the role of mind-mindedness in predicting children's later development (e.g., Lundy, 2003; Meins, Bureau, & Fernyhough, 2018; Meins, Fernyhough, Arnott, Leekam, & de Rosnay, 2013; Meins, Fernyhough, & Centifanti, 2019; Meins et al., 2012; Miller, Kim, Boldt, Goffin, & Kochanska, 2019).

The main aim of the present study was to develop an observation-based measure for assessing mind-mindedness in the preschool years that captured the appropriateness of caregivers' responses but did not rely solely on caregivers' use of internal state language. In order to achieve this aim, it was important to select an observational context that was suitable for eliciting individual differences in caregivers' tendency to treat their children as individuals with minds of their own, and thus to demonstrate mind-mindedness. We chose a loosely-scripted task with no time constraints (adapted from Haden, Ornstein, Eckerman, & Didow, 2001) to provide a context in which the mother and child could collaborate on achieving an ultimate goal, without having to follow step-by-step instructions throughout the task. In the task, the mother was provided with a brief list of activities that should be completed as part of a pretend camping trip, and the associated props and activities were laid out in the developmental laboratory.

How could a caregiver demonstrate mind-mindedness while interacting with their preschooler during such a task? We began with the assumption that mind-minded parents will see parent-child interaction as a process of adaptive and communicative exchange. They will therefore solicit the child's involvement by asking questions and making suggestions. Parents who are mind-minded will also acknowledge their children's comments and contributions to the interaction. These parents will keep the ultimate goal of the task in mind, but allow their children space and time to be creative and to shape how they work together toward this goal. In contrast, parents who are less mind-minded may approach the interaction in terms of a process via which they direct and command the child what to do in order to reach the goal according to the parent's schedule and plan. Such interactions would involve directive statements rather than questions and suggestions, coupled with a tendency to ignore or reject input from the child. We therefore postulated that interactional mind-mindedness in the preschool years would be characterized by higher levels of

solicited child involvement (i.e., using questions and suggestions rather than directives) and adaptive communication (i.e., acknowledging rather than ignoring or rejecting input from the child).

In defining solicited child involvement and adaptive communication as measures of mind-mindedness, we reasoned that these indices should accommodate the interplay between the different aspects of the parent's speech across the entire task. For example, directives are not inherently bad, and can be used to scaffold the child's behavior (e.g., "Pick up the rod so you can catch a fish") or to elaborate on a pretense theme (e.g., "Don't touch the barbecue—it's hot!"). However, if the goal of a large number of comments is to command and instruct the child, the parent will fail to appreciate the child's input and perspective, and thus to demonstrate mind-mindedness. Similarly, it may be appropriate to ignore or even reject the child's suggestion if the parent feels it is not appropriate within the task context (e.g., "No, let's not pretend the pond is a lawn so that we can mow it") or transgresses a moral principle (e.g., "It's not good to kill the fish and then throw them back in the pond"). However, repeatedly ignoring and rejecting the child's input indicates that the caregiver is unresponsive to the child's perspective and is therefore failing to be mind-minded. In order to index mind-mindedness, we thus chose to express the indices of solicited child involvement and adaptive communication in a way that accounted for both mind-minded and non-mind-minded comments. Therefore, solicited child involvement was calculated by summing questions and suggestions while subtracting the total number of directives; adaptive communication was calculated by subtracting the sum of comments that ignored or rejected the child's input from the total number of acknowledgements.

Given the importance of solicited child involvement and adaptive communication for our task of characterizing interaction-based mind-mindedness in the preschool years, it was essential to distinguish these constructs from sensitive, child-centered parenting. Caregivers who adopt such an approach are likely to be involved in the child's play and to talk frequently. For these reasons,

caregiver comments that took the form of statements (e.g., providing the child with information) were not used to calculate solicited child involvement; rather, this index focused only on questions, suggestions, and directives. Nor did we take account of pacing or emotional tone in coding the caregiver's comments for mind-mindedness. For example, questions could be used by the caregiver to "quiz" the child repeatedly about their knowledge of a topic in a way that may appear somewhat insensitive. However, asking the child to recall information that they have learnt undoubtedly means that the caregiver is treating the child as an individual with a mind of their own, and can thus be considered to index mind-mindedness. Similarly, caregivers could acknowledge their children's contributions in ways that may not be considered very sensitive (e.g., replying "Of course we should" in response to the child's suggestion, or correcting the child's comment in some way). Nevertheless, such comments indicate that the caregiver is responsive to the child's perspective and input. As is the case with the infant observational assessment of mind-mindedness, the new preschool measure focuses on quantifying specific types of maternal narrative comments that are proposed to index mind-mindedness. This approach is markedly different from assessments of caregiver sensitivity, which typically assign a global score that summarizes the level of sensitivity observed across in the observation as a whole (e.g., Ainsworth, Bell, & Stayton, 1971, 1974; NICHD Early Child Care Research Network, 2003; Pederson & Moran, 1995). In these ways, the observation-based mind-mindedness measures can be regarded as distinct from sensitivity or child-centered parenting. That said, it was important to demonstrate empirically that the new measures of mind-mindedness and sensitivity are separate constructs, and the present study therefore additionally coded the mother-preschooler interactions for maternal sensitivity.

The established measures of mind-mindedness focus on comments or descriptions with a specific type of content: references to the child's internal states. In contrast, solicited child involvement and adaptive communication assess the pragmatics of the parent's speech—the extent

to which they indicate treating the child as an individual with a mind of their own—rather than its content. However, we also expected caregivers’ use of internal state language when interacting with their children to index mind-mindedness in the preschool years. In describing their children, mind-minded parents spontaneously focus on mental and emotional characteristics; it therefore seems reasonable to propose that this emphasis on internal states would also be observed during parent–child interaction. Surprisingly, little is known about whether parents who use mental and emotional terms to describe their children also use internal state language during actual parent–child interaction. In the only study to have investigated this issue, Devine and Hughes (2019) reported no association between parents’ mind-minded descriptions of their children and their use of internal state language during interaction. However, the interviews used to assess parents’ mind-mindedness in their study followed a somewhat different format from that usually adopted (Meins & Fernyhough, 2015). Whereas the usual procedure is to ask an open-ended question (Can you describe [Name] for me? Can you tell me a little about [Name]?), Devine and Hughes prompted parents “to describe what kind of person their child is and how they get along together”. These authors assessed parents’ internal state language during two brief tasks: joint reading of a wordless picture book, which included several depictions of emotion and belief states (Meyer, 1969), and play with a Playdoh© lunchbox set. No study has yet investigated the relation between mind-minded descriptions obtained using the standard interview procedure and mothers’ use of internal state language during an open-ended mother–child interaction; this was the aim of the present study.

If caregivers’ use of internal state language in the preschool years is indeed an index of mind-mindedness, a positive association should be seen between internal state language during caregiver–child interaction and mind-minded child descriptions. Similarly, if the solicited child involvement and adaptive communication measures are valid assessments of mind-mindedness, positive associations would be expected with mind-minded descriptions. To investigate these

associations, the present study assessed mothers' mind-minded descriptions of their children at ages 44 and 61 months. In order to provide further evidence of the potential validity of the new observation-based measures against established indices of mind-mindedness, the present study also included a measure of appropriate mind-related comments in the first year of life. Positive correlations among appropriate mind-related comments and the new observation-based measures would provide further indication that these variables measure mind-mindedness.

Including established mind-mindedness measures allowed us to attempt to replicate previous findings on the longitudinal stability of mind-mindedness. Meins et al. (2003) reported that mothers' appropriate mind-related comments in the first year of life were positively associated with their mind-minded descriptions of their children at age 4. McMahon, Camberis, Berry, and Gibson (2016) reported similar stability over a shorter period, between 7 and 19 months. We therefore hypothesized that mothers' appropriate mind-related comments in the first year of life would be positively correlated with their later mind-minded descriptions of their children, and that there would be longitudinal stability in mothers' mind-minded descriptions.

Moreover, this longitudinal design enabled us to investigate a question that has so far been neglected: how does mind-mindedness in the first year of life relate to the quality of caregiver-child interaction in subsequent years? As discussed above, there is a wealth of research indicating that early mind-mindedness predicts various aspects of children's later development, as well as caregivers' later mind-minded descriptions of their children, but research has investigated the predictive link between early mind-mindedness and caregiver-child interaction only in terms of the security of the attachment relationship (e.g., Meins et al., 2018; Miller et al., 2019). The present study was thus the first to explore how aspects of the relationship between caregiver and child other than attachment relate to caregivers' mind-mindedness in the first year of life. The present study

also included a measure of children's reported behavioral difficulties in order to control for their potential influence on mother-child interaction.

We further attempted to test whether the new observation-based indices are measures of mind-mindedness by exploring relations with one of the best characterized developmental outcomes of mind-mindedness: children's mentalizing abilities. Several independent studies have shown that appropriate mind-related comments and the describe-your-child assessment of mind-mindedness predict better theory of mind (ToM) and emotion understanding performance throughout the preschool years (Centifanti, Meins, & Fernyhough, 2016; Kirk et al., 2016; Laranjo, Bernier, Meins, & Carlson, 2010, 2014; Meins et al., 1998, 2002, 2003, 2013), with meta-analytic support for mind-mindedness as a predictor of children's false belief understanding (Devine & Hughes, 2018). Finding that the new observation-based indices of mind-mindedness correlated positively with children's later mentalizing abilities would provide further indication that the new indices are measures of mind-mindedness.

Finally, including assessments of children's ToM and emotion understanding enabled us to address an important outstanding question in the mind-mindedness literature: how does mind-mindedness in the first year of life (i.e., mothers' verbal attunement to their preverbal infants' thoughts and feelings) predict children's later understanding of mind? Although several studies have explored potential mediators of this link, the developmental pathway from early mind-mindedness to children's later mentalizing abilities remains unknown. For example, this association is not mediated by infant-mother attachment security (Meins et al., 2002), mothers' mind-minded descriptions of their preschoolers (Meins et al., 2003), or children's age-2 language and perspectival symbolic play (Meins et al., 2013). Our aim was to investigate whether mothers' mind-mindedness during interaction with their preschoolers—as assessed by the newly developed observational

coding scheme—may be the mechanism via which early appropriate mind-related comments relate to children’s later mentalizing abilities.

There is an established literature demonstrating that caregivers’ use of mental state language predicts better mentalizing abilities in their children (e.g., Devine & Hughes, 2018). If mothers’ use of mental state language in the preschool years indexes observation-based mind-mindedness as we propose, this aspect of later mind-minded interaction may thus mediate the relation between mind-mindedness in the first year of life and children’s later mentalizing abilities. The other behaviors proposed to indicate observation-based mind-mindedness in the preschool years may facilitate children’s mentalizing abilities by encouraging children to express their own thoughts, feelings, and perspectives on reality via caregivers’ use of questions and suggestions and acknowledgement of the child’s input. These processes may thus help children to recognize the opacity of mental states, as well as highlighting how belief states rather than reality are intrinsic to maintaining the collaborative pretense scenario. In line with this suggestion, previous research has shown that mentalizing abilities are predicted by higher levels of symbolic play during children’s social interactions with others, but not by the level of sophistication of their solo symbolic play (Astington & Jenkins, 1995; Youngblade & Dunn, 1995). All aspects of the new preschool observation-based mind-mindedness measure would therefore be hypothesized to relate to better mentalizing abilities.

In summary, the present study aimed to develop a new observational assessment of mind-mindedness for use in the preschool years. In order to be considered potential indices of mind-mindedness, the measures of solicited child involvement, adaptive communication, and internal state talk should correlate positively (a) with one another, (b) with mothers’ appropriate mind-related comments in the first year of life, (c) with mind-minded child descriptions, and (d) with children’s later mentalizing abilities. We also investigated whether any observed relations held when SES, maternal sensitivity, children’s reported behavioral difficulties, and children’s verbal

ability were controlled. Finally, the present study explored whether observational mind-mindedness in the preschool years could shed light on the developmental pathway from appropriate mind-related comments in the first year of life to children's later mentalizing abilities.

Method

Participants

Participants were 206 mothers and their children (108 girls). Families were recruited onto a longitudinal study via local healthcare professionals and mother-and-baby groups when their children were aged 8 months. The majority of the children were first-born (42%) and White (98%). Families came from widely ranging SES backgrounds as assessed using the Hollingshead scale (Hollingshead, 1975), with scores ranging from 11 to 66. Ninety families were classed as low SES (parents with no post-16 education and unemployed or in unskilled/menial or semi-skilled/manual employment). Ethical approval (project title: Internal working models and young children's social-emotional development) was obtained from the Universities of Durham and York and local health authority committees (Durham and Darlington, South Tees, North Tees), and participants provided informed consent at all stages of the study. At the beginning of the study, mothers were aged between 16 and 41 years ($M = 28.08$, $SD = 5.48$). At Phase 1, children were aged 8 months ($M = 8.52$, $SD = 0.48$, range 7.0–10.2), at Phase 2, children ($n=171$) were 44 months ($M = 44.06$, $SD = 0.83$, range 42–46), at Phase 3, children ($n=164$) were 51 months ($M = 51.53$, $SD = 0.85$, range = 49–53), and Phase 4 children were age 61 months ($N=164$, $M=61.35$, $SD=1.08$, range 58–64). Attrition was due to families moving away from the area or being unable to schedule a convenient time to complete the testing session. Those families who failed to complete the Phase 4 testing did not differ on any of the variables from those retained throughout the study, but families who dropped out had lower SES scores, $t(204) = 4.17$, $p < .001$, $d = 0.77$. However, despite this SES-

specific attrition, the sample remained socially diverse, with 63 families in the low SES group at Phase 4.

Materials and Methods

Overview of Testing Phases. Mind-mindedness was assessed at three time points: at 8 months using the observational measures of appropriate and non-attuned mind-related comments, and at 44 and 61 months using the describe-your-child assessment. The new observation-based assessment of mind-mindedness was administered at 44 months. Maternal sensitivity and children's reported behavioral difficulties were assessed concurrently with the new assessment of mind-mindedness at 44 months. Children's ToM and emotion understanding abilities were assessed at two time points: 51 and 61 months. Children's receptive verbal ability was assessed at 51 months.

Established Indices of Mind-Mindedness. At 8 months, the observation-based assessment of mind-mindedness was used. The mother and infant were filmed in a 20-minute free play session in the University's developmental laboratories. Mothers were simply instructed to play with their infants as they would if they had spare time together at home. Mothers' speech during the session was later transcribed verbatim. Using the transcripts in conjunction with the filmed observations, each comment in which the mother made a reference to the infant's internal state (mind-related comments) was coded as appropriate or non-attuned using Meins and colleagues' coding procedures (Meins & Fernyhough, 2015; Meins et al., 2001, 2012). Appropriate mind-related comments are those which (a) accurately reflect the current infant's internal state, (b) link the infant's current internal state with similar events in the past or future (e.g., remembering, recognizing), (c) suggest new activities that the infant would like or want after a lull in the interaction, or (d) voice what the infant would say if s/he could talk. In contrast, non-attuned mind-related comments are those that misinterpret the infant's internal state through attributing an internal state that appears at odds with the infant's current behavior, or those where the referent of the comment is not clear.

Mind-mindedness was assessed by a trained researcher who was blind to all other data, and a randomly selected 25% of observations were coded by a second blind researcher; inter-rater agreement for dichotomously coding mind-related comments as appropriate or non-attuned was $\kappa = .70$. Mothers received scores for appropriate mind-related comments as a proportion of the total number of comments made during the interaction to control for verbosity. High scores for appropriate mind-related comments indicate high levels of mind-mindedness.

Mind-mindedness was assessed at ages 44 and 61 months using the describe-your-child interview (Meins et al., 1998). Mothers completed the interview as part of a longer experimental session at the University's developmental laboratories. Before beginning the interview, the researcher explained that the purpose of the interview was to understand how parents thought about their children. The researcher made it clear that there were no right or wrong answers to the questions, and mothers were told that they should just talk about the first things that came into their heads. The interviews lasted between 2 and 8 minutes, and questions were asked in the following order: (a) could you describe [child's name] for me please? (b) What is the best thing about [child's name]? (c) What sort of things do you try to teach him/her?

Mothers' answers to the describe-your-child question were subsequently transcribed verbatim and coded for mind-mindedness using Meins and colleagues' (Meins & Fernyhough, 2015; Meins et al., 1998) procedures. Answers were first divided into discreet attributes describing the child, and each attribute was then assigned to one of four exhaustive and exclusive categories: (a) Mental: any reference to the child's cognitions, emotions, desires, interests, intellectual abilities, motivations, will, or imagination, (b) Behavioral: any reference to the child's behavior, such as activities, actions, games, or interactions the child has with other people on a purely behavioural level, (c) Physical: any reference to the child's physical characteristics, age, or position in the family, (d) General: any comments that did not fit in the three previous categories.

Interviews were coded by a researcher who was blind to all other data, and a randomly selected 25% was coded by a second blind researcher; inter-rater agreement was $\kappa = .90$. Mothers received scores for the different description categories as a proportion of the total number of descriptions produced. High scores on the mental description category indicate mind-mindedness.

Observation-Based Mind-Mindedness in the Preschool Years. Mother–child dyads took part in a play interaction when children were 44 months old, which was video- and audio-recorded. The loosely-scripted interaction was based on Haden et al.’s (2001) procedure. The mother–child dyads were introduced to a range of props relating to a camping trip, laid out in a set sequence, and mothers were given a brief set of instructions to indicate the tasks and activities they were required to complete: load the backpack with the food, follow the path to the pond, catch a fish, follow the footprints to the campsite, cook and eat a meal, go to sleep. Mothers were not given any further instructions, and they were informed that there was no time limit for the task. Mothers and their children started the task sitting on a sofa, with a collection of toy food items and a backpack close to their feet; a yellow path led from the sofa to a fish pond close by, from which there was a set of footsteps leading to a toy barbecue and a sleeping bag. The average time taken on the task was 12 minutes 26 seconds (range 5 minutes 30 seconds to 34 minutes 50 seconds).

All of the interactions were transcribed verbatim and divided into discrete utterances. An utterance was defined as a word or string of words identified by a significant pause or grammatical completeness (Golinkoff & Ames, 1979). Transcripts were then coded using a scheme formulated specifically for this study (see Table 1), in order to assess observation-based mind-mindedness.

The definition of maternal adaptive communication, namely a mother’s tendency to acknowledge her child’s comments and behavior, was influenced by global rating schemes which have been formulated for use during parent–child interactions (Deater-Deckard, Pylas, & Petrill, 1997; Humber & Moss, 2005; Patterson, Elder, Gulsrud, & Kasari, 2014). However, rather than rely

on global ratings, the current research chose to code maternal responses to all of her child's conversational turns in order specifically to represent the mother's level of involvement throughout the interaction. The coding of other forms of maternal behavior, including the form and content of the mother's speech, was influenced by and modified from Parpal and Maccoby's (1985) coding scheme. As explained below, every comment made by the mother was coded for (a) form (question, suggestion, directive, or statement), and (b) content (internal state talk vs. no internal state talk). Comments immediately following input from the child were additionally coded for response (acknowledge, ignore, reject). Figure 1 summarizes the process for coding mothers' comments during the interaction.

Form. All maternal speech was coded to indicate 'form', which fell into one of the four following exhaustive and exclusive categories: (a) questions, (b) suggestions, (c) directives, or (d) statements. As shown in Table 1, the *questions* category included only genuine questions that were phrased to elicit a response from the child. Comments that were simple descriptive statements followed with "isn't it", "don't you", etc. were coded as *statements* and not *questions*; comments that were directives framed in question format (e.g., "Put the food in the backpack, will you?") were coded as *directives* rather than *questions*. Comments in the *suggestions* category could be formulated as questions, but unlike genuine questions, required no answer or only a simple yes/no answer from the child (see Table 1). As well as being less command-like than *directives*, *suggestions* are distinguished by the fact that they focus on the child's ongoing activity or speech (e.g., "Shall we put the fish on?" while the child is cooking food on the barbecue; "Do you want to put that on the bed?" when the child picks up the teddy bear), whereas *directives* tend to be unrelated to the child (e.g., "Let's go and cook the food now" while the child is still fishing in the pond). Comments that did not fall into the *questions*, *suggestions*, or *directives* categories were coded as *statements* (see Table 1).

Mothers received frequency scores for each of the four categories. The mind-mindedness index of *solicited child involvement* was calculated by subtracting the number of directives from the sum of questions and suggestions. With regard to bivariate correlations between the scores on the measures used to calculate solicited child involvement, questions were positively correlated with suggestions, $r(169) = .61, p < .001$, questions were unrelated to directives, $r(169) = -.002, p = .982$, and suggestions were unrelated to directives, $r(169) = -.11, p = .155$. Note that comments in the statements category were not used in the calculation of solicited child involvement.

Content. Every comment was coded for the presence or absence of internal state talk. As shown in Table 1, the internal states could refer to the child, the mother, both mother and child, or others. Mothers received a score for total number of comments that included internal state talk.

Response. Finally, the interactions were coded to assess how mothers responded to input from the child. Mothers' responses to the child's utterances or actions were coded as (a) acknowledge, (b) ignore, or (c) reject (see Table 1). These responses were usually verbal, but could also be non-verbal (e.g., a nod of the head; taking, refusing, or failing to notice an object offered by the child). Mothers received frequency scores for each of the three categories. The mind-mindedness index of *adaptive communication* was calculated by subtracting the sum of ignore and reject from the total number of acknowledgements. With regard to bivariate correlations between the scores on the measures used to calculate adaptive communication, ignore responses were positively correlated with acknowledge responses, $r(169) = .22, p = .004$, and reject responses, $r(169) = .24, p = .002$, and reject and acknowledge responses were unrelated, $r(169) = .06, p = .451$.

All of the sessions were coded by a researcher who was blind to all other data, with a second blind researcher coding a randomly selected 20%. Since transcripts were sectioned into individual comments before coding, there were no disagreements relating to frequency counts of comments. Inter-rater reliabilities were as follows: for form of maternal speech (statement, suggestion,

question, directive), $\kappa = .97$; for content of maternal speech (internal state child, internal state mother, internal state mother and child, internal state other), $\kappa = .99$; for maternal response (acknowledge, ignore, reject), $\kappa = .92$.

Maternal Sensitivity. The camping trip task at 44 months from which the new mind-mindedness measures were derived was also coded for maternal sensitivity using the global ratings scales employed in the NICHD study (e.g., NICHD Early Child Care Research Network, 2003). Each mother received separate scores on a 7-point scale to indicate the level of three behaviors throughout the entire camping trip observation: supportive presence, hostility/intrusiveness, and respect for autonomy; higher scores indicated higher levels of these three behaviors. Supportive presence assesses the caregiver's tendency to express positive feedback on and confidence in the child's ability and to provide emotional and physical support if the child experiences difficulties by, for example, moving closer. Hostility/intrusiveness indexes the extent to which the caregiver interferes with the child's behavior and exploration; this interference may have either a harsh or affectionate emotional tone. Respect for autonomy measures the caregiver's ability to structure the situation and instruct the child so that the nature or goal of the task is understood. The overall sensitivity score was calculated by summing the scores for supportive presence, hostility/intrusiveness (reverse scored), and respect for autonomy (NICHD Early Child Care Research Network, 2003). Cronbach's α for the composite sensitivity scores was .79. All of the observations were coded by a trained rater, with a randomly selected 20% coded by a second trained rater; inter-rater reliability was calculated using intraclass correlations: supportive presence ICC = .87, hostility/intrusiveness ICC = .87, respect for autonomy ICC = .84.

Child Behavior. Behavioral difficulties were assessed using the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), which was completed by the children's mothers at age 44 months. The SDQ includes 25 items that are each rated on a 3-point scale ("not true", "somewhat

true”, “certainly true”), yielding scores of behavioral difficulties in four areas: (a) emotional symptoms, (b) conduct problems, (c) hyperactivity, and (d) peer problems. Scores on the four subscales can be summed to give a Total Difficulties score (range 0–40). Cronbach’s α was .79 for the Total Difficulties scores.

Theory of Mind. At 51 and 61 months, children completed a ToM battery based on Wellman and Liu (2004) containing the following tasks: (a) Diverse Beliefs, (b) Knowledge Access, (c) Contents False Belief – Other, (d) Contents False Belief – Self, (e) Explicit False Belief, and (f) Unexpected Transfer. Tasks were presented in a randomized, counterbalanced order, and the gender of the story protagonists matched the child’s gender. All memory and reality control questions had to be passed in addition to the test question for the child to be credited with passing the individual task. Children received 1 point for passing each task, resulting in total possible scores ranging between 0 and 6.

Cronbach’s α for the ToM battery was .63 at 51 months, and .68 at 61 months. This level of internal reliability is in line with those of studies that have employed similar ToM batteries (e.g., Astington & Jenkins, 1999).

Emotion Understanding. At 51 months, children’s emotion understanding was assessed using Denham’s (1986) task and three items from the Test of Emotion Comprehension (TEC; Pons, Harris, & de Rosnay, 2004). In Denham’s (1986) task, the experimenter gives tone-of-voice cues to the correct emotional response, but all of the TEC items are administered in an emotionally neutral tone.

Denham’s task consists of three sections: (a) labeling four emotional facial expressions (happy, sad, cross, scared), (b) using situational context as a cue to these four emotions, and (c) recognizing that different people may have different emotional responses to the same event. For (a) children were assessed for their ability to generate the emotional label and choose the correct face to

match the emotional label given by the experimenter. Children received 2 points for each correct response, 1 point for an incorrect response of the correct valence (e.g., sad for scared), and 0 for any other incorrect response, with potential scores ranging between 0 and 16.

For (b) children heard four vignettes in which one of the four emotions would unequivocally be felt by the story protagonist (e.g., feeling scared after a nightmare). Children were required to label the emotion in each vignette, with scores for each response ranging between 0 and 2 as described above. Total scores for this section ranged between 0 and 8.

For (c) children's mothers had previously reported how their children responded to a number of emotionally equivocal situations (e.g., being approached by a dog). The six vignettes in (c) presented the protagonist expressing the emotion that was atypical of the target child (e.g., being happy to see the dog if the mother had reported that the child was scared of dogs). Children thus had to label emotions non-egocentrically, and received a score for each item ranging between 0 and 2 as described above. Total scores for section (c) ranged between 0 and 12.

The three TEC items involved (a) simple causes of emotions, (b) relations between desires and emotions, and (c) knowledge/ignorance and emotion. For simple causes of emotions, children received five vignettes (e.g., child looking at his/her pet turtle that had just died) in which the child had to label the target emotion by pointing to one of five cartoon faces (happy, sad, cross, scared, all right). For the relations between desires and emotions, children received two items to assess their understanding of two different people's emotional response to a desire being satisfied or unsatisfied (e.g., receiving a drink they liked or hated when they were thirsty). For knowledge/ignorance and emotion, one item assessed children's understanding of the relation between knowledge/ignorance and someone's emotional response (i.e., a rabbit eating a carrot and being unaware of a wolf behind a bush). For each item, if all reality and/or memory control questions were passed, children received

1 point for each emotion they labeled correctly, yielding total potential scores between 0 and 10.

For the items on the Denham (1986) task and the TEC at 51 months, Cronbach's $\alpha = .66$.

At 61 months, children's emotion understanding was assessed using the following TEC items: (a) relations between desires and emotions, (b) knowledge/ignorance and emotion, (c) understanding that emotions can be hidden, and (d) understanding the relation between false belief and emotion. All of these items require an understanding of how cognitive states influence emotional responses, unlike the emotion understanding items administered at age 51 months. These items were chosen to avoid ceiling and floor effects based on Pons et al.'s (2004) age-related data.

For the relations between desires and emotions, children received two items to assess their understanding of two different people's emotional response to a desire being satisfied or unsatisfied (e.g., receiving a drink they liked or hated when they were thirsty); children received 1 point for correctly labeling each protagonist's emotional reaction, with total scores ranging between 0 and 4. For knowledge/ignorance and emotion, two items assessed children's understanding of the relation between knowledge/ignorance and someone's emotional response (e.g., a rabbit eating a carrot and being unaware of a wolf behind a bush); children received 1 point for correctly labeling the target emotion (range 0–2). Children received two items assessing their understanding that emotions can be hidden (e.g., smiling to hide sadness caused by being teased); children received 1 point for correctly labeling the emotion that was being hidden (range 0–2). For the understanding of false belief and emotion items, the child had to label the naïve protagonist's initial emotional response upon discovering a container of favorite food that the child knew actually contained a food the protagonist disliked (range 0–2). All memory and reality control questions needed to be passed for the child to be given credit for each item, with total potential scores for emotion understanding at age 61 months ranging between 0 and 10. Total scores were used in the analyses; Cronbach's $\alpha = .60$.

Receptive Verbal Ability

Children's receptive verbal ability was assessed using the British Picture Vocabulary Scale II (BPVS; Dunn, Dunn, Whetton & Burley, 1997) at 51 months. Standardized BPVS scores were used in the analyses.

Data Availability

The data file and study analysis code are available via the Open Science Framework (Meins & Centifanti, 2021, <https://osf.io/hg7cm/>). This study was not preregistered.

Results

Descriptive Statistics and Preliminary Analyses

Allowing for cases of non-completion or technical difficulties with the recordings, data were available as follows: 205 mothers had mind-mindedness data at 8 months, 166 mothers completed the describe-your-child procedure at 44 months, and 156 mothers completed the describe-your-child procedure at 61 months.

Table 2 shows the descriptive statistics for all variables. Gender was unrelated to the established mind-mindedness variables ($ts < 0.80$, $ps > .430$). Gender was also unrelated to the new observation-based measures of mind-mindedness ($ts < 0.41$, $ps > .685$). Gender was unrelated to age-4 emotion understanding, $t(159) = 0.88$, $p = .379$, but girls ($M=3.31$, $SD=1.73$) performed better on the ToM battery than did boys ($M=2.73$, $SD=1.73$), $t(159) = 2.13$, $p = .035$. Table 3 shows the correlations between the main study variables and SES; correlations reported in previous papers [references omitted for blind review] are shown in bold. As shown in Table 3, SES was positively correlated with numerous variables.

Replicating previous findings (McMahon et al., 2016; Meins et al., 2003), Table 3 shows that mothers' appropriate mind-related comments at 8 months were positively correlated with

mothers' mind-minded descriptions of their children at both 44 and 61 months, and mothers' mind-minded descriptions of their children were positively correlated over time.

The New Observation-Based Measures of Mind-Mindedness in the Preschool Years

With regard to relations with the control variables, 44-month observation-based mind-mindedness scores were positively correlated with SES and mothers' concurrent sensitivity scores, and negatively correlated with children's concurrent reported behavioral difficulties (see Table 3).

As shown in Table 3, scores for solicited child involvement, adaptive communication, and internal state talk during the camping trip task were highly positively correlated. Table 3 shows the correlations among the established mind-mindedness variables and the scores for the new observation-based mind-mindedness measure. The new observation-based mind-mindedness variables were positively correlated with (a) appropriate mind-related comments at age 8 months, and (b) mothers' mind-minded descriptions of their children both concurrently and at 61 months.

We examined how well the three subscales of the observational mind-mindedness measure, the appropriate mind-related comments, and describe-your-child measure at 44 months were represented by a latent factor of mind-mindedness. We used Mplus 7.3 (Muthén & Muthén, 2010) with maximum-likelihood (MLR) estimation with robust standard errors (robust to issues of non-normality and missingness). The loading for solicited child involvement was fixed at 1, with the other loadings estimated; factor variance was also estimated. We examined indices of practical fit (CFI, Bentler, 1990; RMSEA, Browne & Cudeck, 1993; TLI, Tucker & Lewis, 1973). A comparative fit index (CFI) and TLI $>.95$ suggests a good model fit (Bentler & Bonett, 1980). A root mean square error of approximation (RMSEA) $<.08$, suggests an acceptable fit (Browne & Cudeck, 1993). With this saturated model, these indices should indicate good fit. Indeed, χ^2 was non-significant, and the indices of practical fit suggested the model was saturated, $\chi^2(5) = 7.69, p = .174$; TLI = .98, CFI = .99, RMSEA = .051, 90% CI = .000, .118. In the next SEM model, we tested

how SES, child gender, maternal sensitivity, and child behavioral difficulties at 44 months related to the latent factor of mind-mindedness by regressing mind-mindedness onto the covariates. This model was also a good fit, $\chi^2(21) = 23.66$, $p = .310$; TLI = .99, CFI = .99, RMSEA = .027, 90% CI = .000, .073.

Figure 2 shows the results of this SEM model, with completely standardized estimates and factor loadings, and standard errors in parentheses. Generally there were moderate to strong relations between indicators and their respective latent factor of mind-mindedness, with no indicator under .30. Standard errors were also similar across the indicators (.05–.07). Maternal sensitivity and child behavioral difficulties predicted significant variance in the latent factor of mind-mindedness, estimate = 7.02, SE = 1.10, $\beta = .47$, 95%CI = 0.34, 0.59, $t = 7.00$, $p < .001$, and estimate = -1.45, SE = 0.52, $\beta = -.22$, 95%CI = -0.35, -0.09, $t = -3.34$, $p = .001$, respectively. SES was positively predictive of mind-mindedness, estimate = 13.04, SE = 5.84, $\beta = .16$, 95%CI = 0.02, 0.30, $t = 2.23$, $p = .026$. Gender was unrelated. Thus, the latent variable including established measures of mind-mindedness and the new observational measures was a good fit, and related to SES, maternal sensitivity, and children's behavioral difficulties.

Pathways from Mind-Mindedness at Age 8 Months to Children's Mentalizing Abilities

To examine whether the new observation-based mind-mindedness measure mediated the relation between appropriate mind-related comments at age 8 months and age-4 and age-5 emotion understanding and ToM, structural equation modeling was conducted. This was done using Mplus 7.3 (Muthén & Muthén, 2010) with maximum-likelihood (MLR) estimation with robust standard errors. Covariance coverage of the data ranged from .96 to 1.00, which is higher than the recommended .10.

We regressed age-4 and age-5 emotion understanding and ToM onto appropriate mind-related comments, the 44-month latent mind-mindedness variable, gender, SES, sensitivity,

children's verbal ability, and child behavioral difficulties. The indirect effects were estimated for mind-related comments to be associated with greater emotion understanding at age 4 or 5 years via the latent variable for the new observation-based measure. Additionally, indirect effects were estimated for mind-related comments to be associated with greater ToM at age 4 or 5 years, again via the latent observation-based measure. χ^2 was non-significant, and the indices of practical fit suggested the model was saturated, $\chi^2(20) = 17.98, p = .589$; TLI = .1.00, CFI = 1.00, RMSEA = 0.000.

Figure 3 shows the standardized estimates and the 95% confidence intervals around those estimates for all significant effects. For emotion understanding at age 4, appropriate mind-related comments and the latent factor of mind-mindedness were both significant positive predictors. Additionally, children's verbal ability and gender were significant predictors. The only predictor of age-5 emotion understanding was children's verbal ability. The autoregressive association over time for emotion understanding did not reach significance. The variances explained for emotion understanding at age 4 and age 5 were both significant, $R^2 = .38, t = 5.25, p < .001$; $R^2 = .29, t = 4.38, p < .001$, respectively.

For ToM, gender and verbal ability were both significant predictors of ToM at age 4, and the association between appropriate mind-related comments and age-4 ToM approached significance. Verbal ability was also a significant predictor of age-5 ToM. Total variance explained in ToM at age 4 and age 5 was significant, $R^2 = .25, t = 4.78, p < .001$; $R^2 = .38, t = 6.83, p < .001$, respectively. The autoregressive coefficient was significant, indicating that ToM was fairly stable over time. Also, the associations between emotion understanding and ToM were significant at each time point.

To answer the research questions around mind-mindedness and later child mentalizing abilities, we examined the direct and indirect effects. The direct effect of appropriate mind-related

comments on age-4 emotion understanding was significant, coefficient = 0.21, SE = 0.08, $t = 2.47$, $p = .014$, 95% CI = 0.04, 0.37. The direct effect of appropriate mind-related comments on age-4 ToM approached significance, coefficient = 0.06, SE = 0.03, $t = 1.93$, $p = .054$, 95% CI = -0.001, 0.13. Although appropriate mind-related comments predicted the observation-based mind-mindedness measure at 44-months, and this in turn predicted emotion understanding at age-4, the indirect effect was not significant, coefficient = 0.05, SE = 0.03, $t = 1.40$, $p = .163$, 95% CI = -0.02, 0.11. None of the indirect effects were significant in explaining emotion understanding at age-5 or ToM at either age. Thus, no mediation was evident for either aspect of children's mentalizing abilities.

Discussion

The overarching aim of the study reported here was to develop a new observational assessment of caregiver mind-mindedness in the preschool years, in order to shed light on the developmental pathway from mothers' appropriate mind-related comments in the first year of life to later children's mentalizing abilities. The extant literature characterizes mind-mindedness from the preschool years onwards in terms of caregivers' tendency to focus on mental and emotional characteristics when given an open-ended invitation to describe the child (Meins et al., 1998), but this measure does not index the caregiver's tendency to treat their child as an individual with a mind of their own during actual caregiver-child interaction. We argued that caregivers' engagement in three types of behavior would indicate that they were interacting with their child in a way that demonstrated mind-mindedness: solicited child involvement (the tendency to make suggestions and pose questions rather than direct and instruct), adaptive communication (the tendency to acknowledge rather than ignore or reject the child's input and perspective), and use of internal state talk. These behaviors were assessed in the context of a loosely-scripted play interaction between mothers and their 44-month-olds.

The results of the SEM analysis corroborated those of the correlational analyses in providing evidence that the new measure assessed mind-mindedness. The latent variable of interactional mind-mindedness at 44 months was positively associated with both of the established indices of mind-mindedness (appropriate mind-related comments at age 8 months and concurrent mind-minded child descriptions), independently of child gender, SES, maternal sensitivity, and children's behavioral difficulties. These results provide converging evidence that solicited child engagement, adaptive communication, and internal state talk may be considered indices of interactional mind-mindedness in the preschool years.

As discussed in the Introduction, research has so far failed to identify the mechanism via which early mind-mindedness facilitates children's later understanding of mind. This relation is apparently not mediated by infant–mother attachment security (Meins et al., 2002), mothers' mind-minded descriptions of their preschoolers (Meins et al., 2003), or children's age-2 language or perspectival symbolic play (Meins et al., 2013). While the path analysis showed that the latent variable of observational mind-mindedness at 44 months directly predicted children's emotion understanding at age 4, there was no evidence that mind-mindedness at 44 months mediated the relation between appropriate mind-related comments and emotion understanding; the direct relation between these variables was maintained with 44-month observation-based mind-mindedness included in the path analysis. The pattern of findings was somewhat different for relations between mind-mindedness and children's ToM abilities. The path analysis showed that the relation between appropriate mind-related comments and age-4 ToM was only a non-significant trend, and there was no association between the new observational measure of mind-mindedness and children's later ToM. However, as was the case for emotion understanding, there were no significant indirect effects indicating mediation of the link between appropriate mind-related comments and children's ToM.

These findings add to the body of literature (Meins et al., 2002, 2003, 2013) that has failed to identify a mechanism via which mothers' attunement to their infants' internal states in the first year of life predicts children's later mentalizing abilities. The possibility that this link may be direct is intriguing, given one's intuition that some aspect of the parent-child relationship or children's development in the preschool years should mediate the relation between mothers' early attunement to their infants' internal states and children's understanding of other minds several years later. Of course, many potential mediator variables have not yet been explored. One interesting possibility is that children's early behavioral and emotional control and regulation may be the mechanism via which early mind-mindedness predicts children's later emotion understanding, given that regulation is positively associated with both mind-mindedness (Bernier, Carlson, & Whipple, 2010) and mentalizing abilities (Carlson, Mandell, & Williams, 2004; Carlson & Moses, 2001).

The fact that the path analysis showed that the new measure of mind-mindedness predicted children's emotion understanding—but not their ToM—is worthy of further discussion. Why might mothers' tendency to treat their children as individuals with minds of their own during interaction in the preschool years predict this specific aspect of mentalizing abilities? Children acquire language relating to desires and feelings before that relating to more complex internal states such as beliefs (Bartsch & Wellman, 1995; Bretherton & Beeghly, 1982; Wellman, Harris, Banerjee, & Sinclair, 1995). Two-year-olds are capable of identifying simple emotions (Denham, 1986), and 3-year-olds can talk about others' feelings and understand that particular contexts elicit specific emotional reactions (Denham, 1986). In contrast, children typically do not pass tests requiring an understanding of belief states—the classic marker of having acquired a ToM—until around age 4 (Wellman & Liu, 2004). This greater temporal contiguity between preschool mind-mindedness and the emergence of emotion understanding may account for the fact that mind-mindedness predicted this specific aspect of children's later mentalizing abilities. In addition, this proposal is consistent

with the observation that this predictive relation was significant for children's emotion understanding at age 4, but not at age 5.

The present study replicated the previous finding that mothers' early appropriate mind-related comments are positively associated with their later mind-minded descriptions of their children (McMahon et al., 2016; Meins et al., 2003). We also demonstrated that mind-minded descriptions are positively associated over time, suggesting a degree of stability in caregivers' tendency spontaneously to represent their children in terms of the mental and emotional attributes between 3 and 5 years of age. There was, however, one area in which the new observation-based mind-mindedness variables differed from the established mind-mindedness indices: relations with SES. There is little convincing evidence that appropriate mind-related comments or mind-minded child descriptions are determined by the caregiver's SES (e.g., Bigelow, Power, Bulmer, & Gerrior, 2015; Laranjo & Bernier, 2013; McMahon, Camberis, Berry, & Gibson, 2016; Meins, Fernyhough, Arnott, Turner, & Leekam, 2011; Meins et al., 1998). In contrast, solicited child engagement, adaptive communication, and internal state talk were all positively correlated with SES. It is worth noting that the 44-month describe-your-child measure of mind-mindedness was also positively correlated with SES in the present study. However, the path analyses controlled for SES, and so the relations described above among observation-based mind-mindedness, the established indices of mind-mindedness, and children's mentalizing abilities cannot be explained in terms of SES.

Although we did not achieve our aim of identifying the mechanism via which early appropriate mind-related comments predict children's later mentalizing abilities, developing a new observation-based measure for assessing mind-mindedness in the preschool years has extended our understanding of the construct of mind-mindedness and its developmental outcomes. First, the present study provides the first data indicating that mind-mindedness in the first year of life predicts the quality of mother-child interaction in the preschool years. As discussed in the Introduction,

previous studies have only investigated this predictive relation by using attachment security as the outcome measure. These findings thus suggest a degree of long-term continuity in interaction-based mind-mindedness and its relation with the quality of caregiver–child interaction.

Second, our data show that the describe-your-child measure of mind-mindedness relates to the quality of concurrent mother–child interaction. Lundy (2013) previously reported that mind-minded child descriptions were positively correlated with both mothers' and fathers' tendency to use feedback on their 4-year-olds' ongoing performance in completing a complex puzzle task to modify the level of specificity of their instructions (Meins, 1997; Wood & Middleton, 1975; Wood, Wood, & Middleton, 1978). Our findings showed that mind-minded descriptions are related to mothers' soliciting child involvement, adaptive communication, and internal state talk during open-ended play, indicating a concurrent link between parents' mind-minded representations of their children during interview and their tendency to be mind-minded during actual parent–child interaction. Interaction-based mind-mindedness in the preschool years could thus be construed as a form of scaffolding behavior that is not solely limited to teaching or task-based contexts, but applies to the caregiver's general mode of interaction with the child. Whereas scaffolding involves specific monitoring of the child's performance on a given task, mind-mindedness requires the caregiver continually to represent the child's overall perspective during any form of interaction. It would be interesting to explore how the new observation-based measure of mind-mindedness relates to caregiver's scaffolding behavior during cognitive tasks. Future research could also investigate how observation-based mind-mindedness relates to other measures that assess the quality of caregiver–child interaction in the preschool years. For example, Ensor and Hughes (2008) assessed the extent to which mother and child conversational turns are connected, defined as utterances being semantically related to the other speaker's previous turn. They reported positive associations between this connected conversation and children's later mentalizing abilities. Exploring how

connected conversations relate to the mind-mindedness indices of solicited child involvement and adaptive communication, and how these different aspects of caregiver–child interaction function in concert to predict children’s later understanding of mind, would be an interesting avenue of research.

The present study also further clarified the relation between mind-mindedness and caregivers’ behavioral sensitivity. Previous research has investigated this issue in the first year of life, reporting positive correlations between concurrent measures of appropriate mind-related comments and maternal sensitivity (e.g., Meins et al., 2001, 2012). However, the magnitude of these correlations indicates a medium effect size, demonstrating that the two constructs are distinct. Similarly, the present study found that the three new indices of observation-based mind-mindedness were positively correlated with concurrent maternal sensitivity. As was the case for relations in the first year of life, the correlation coefficients were not sufficiently large (ranging between .36 and .51) to suggest that sensitivity and mind-mindedness are different measures of the same construct. Moreover, sensitivity was controlled in the path analyses, and yet observational mind-mindedness—and not sensitivity—predicted children’s later mentalizing abilities. This suggests that the assessments of observational mind-mindedness and sensitivity are also distinct in terms of their predictive relations with other variables. However, given that sensitivity and observational mind-mindedness were assessed from the same mother–child interaction, it would be interesting to explore whether the two constructs are similarly related when assessed from separate interactions.

The development of this new measure of mind-mindedness opens up multiple avenues for future research. While the present study provides encouraging evidence that this measure assesses mind-mindedness, more research is needed to replicate these findings in order to provide more formal validation of the observational preschool assessment as a measure of mind-mindedness and to clarify its distinction from behavioral sensitivity and other measures of caregiving. In particular,

it is important for future research to investigate individual differences in this new measure in samples that benefit from ethnic and cultural diversity, as well as being socially and economically diverse. There is a well-established literature on how parenting practices and beliefs about optimal parenting vary across different cultural and ethnic groups. For example, authoritarian parenting practices involving high levels of control and discipline are considered normative in East Asian cultures, where filial piety is highly valued (e.g., Choi, Kim, Kim, & Park, 2013). Recent research also shows that South Korean parents report high levels of confidence in their ability to know exactly what their young children are thinking and feeling (Lee, Meins, & Larkin, 2021). Differences among low-income US mothers from different ethnic and cultural backgrounds have also been identified, with low-income European American mothers showing less intrusiveness with their infants than their African American and Mexican American counterparts (Ispa et al., 2004). Critically, however, while high levels of control and intrusiveness are associated with low parental warmth and less optimal child outcomes in parents who are culturally and ethnically European, this association does not appear to hold in other groups. Choi et al. (2013) reported that traditional Korean parenting values were positively associated with parental warmth and acceptance, with typical Korean parenting style being a mix of authoritarian and authoritative practices. Specifically in African American families, maternal warmth was shown to moderate the association between intrusiveness and increases in child negativity (Ispa et al., 2004). Given this variability across different groups of parents, future research should investigate whether there are cultural and ethnic differences on the observational mind-mindedness measure that we have developed, and explore whether mind-mindedness in the preschool years predicts children's later development across cultures. It would also be interesting to investigate whether positive associations between observational mind-mindedness and caregiver sensitivity are observed cross-culturally.

While the new observation-based measure of mind-mindedness could not shed light on the

developmental pathway from mind-mindedness in the first year of life to children's later understanding of mind, future research could explore whether this measure can help explain recently reported longer-term developmental outcomes of early mind-mindedness, such as children's educational attainment (Meins et al., 2019). This study found that mothers' appropriate mind-related comments in the first year of life predicted higher grades in national school examinations at age 7 and 11 in children from disadvantaged backgrounds, but not in their more affluent peers. Given the observed positive associations between the new preschool mind-mindedness indices and SES, it would be interesting to investigate whether mind-mindedness in the preschool years relates to educational attainment in children from different social and economic backgrounds.

In summary, the research described here makes several contributions to our understanding of the complex relations among early caregiver mind-mindedness, later caregiver–child interaction, and children's developing understanding of other minds. We have presented a new measure of interaction-based mind-mindedness for use in the preschool years, which we hope will prove useful in further research investigating how children's development is shaped by their early interactions with others.

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Table 1

Description of the Observation-Based Coding Scheme for Mind-Mindedness in the Preschool Years

Description	
General Features	
Total number of maternal utterances	The sum of all maternal utterances related to the play scenario
Total number of child utterances	The sum of all child utterances related to the play scenario
Response was coded by assessing mothers' responses to their child's conversational turn and/or action. One of the following three exhaustive and exclusive codes was assigned for every maternal response to their child.	
Acknowledge	The mother acknowledges the child's comment/behaviour during a conversational turn, or provides a response for the question they have asked (e.g. C: 'Mummy, what is this?' M: 'That's a burger, darling').
Ignore	Comments that are not responses to the child's utterance or action, or where there has been a sufficient lull in conversation prior to the mother suggesting a new topic or focus.
Reject	Comments that reject the child's suggestion or input (e.g., C: 'Let's have a barbecue' M: 'No, I'm catching some fish for dad', or C: 'I don't like sausages' M: 'Yes, you do'). Note that factual corrections by the mother of information provided by the child should not be coded as rejections; these should be coded as acknowledgements.

Form

Question

An utterance that required an appropriate verbal response from the child (e.g., ‘How many fish have we got?’ ‘What is that?’ ‘What do you want, fish or burger?’). Questions that were rhetorical in nature, or a description phrased as a question (e.g., “That’s a burger, isn’t it?”) were not included in the ‘questions’ category.

Suggestion

The mother makes a suggestion to influence or scaffold the current play scenario, or stimulate associated play in a non-directive nature (e.g., ‘We can cook them for our tea, can’t we?’ ‘Shall we put the fish on?’ ‘Do you want to put that on the bed?’).

Directive

Directive questions, clearly stated requests, commands, orders, rules, and suggestions of which there is no option (e.g., ‘Put that in your bag’ ‘Get me that fish’ ‘Careful, that’s hot, don’t touch!’).

Statement

Comments relating to ongoing activity, general remarks, narrative related to instructions for play, what is happening or will happen during the play scenario, talking to self, or minimal content (e.g., ‘So we need to load the backpack with food and go on a picnic’ ‘We’ll pop that in there’ ‘Here’s the path, look’ ‘Uh oh’).

Content

Internal state talk

Comments relating to internal state activity, metacognition, emotions, thoughts, knowledge, desires (e.g., remember, think, know, want, like, love, clever). Comments could reference the internal states of (a) the child (e.g., ‘You like torches, don’t you?’ ‘What do you want?’ ‘What do you think we will need?’); (b) the mother (e.g., ‘I thought we were going to make up the tent’ ‘I’d like a nice cup of tea’), (c) both child and mother (e.g., ‘A spoon, we mustn’t forget that’ ‘We forgot to light the fire’) or (d) others (e.g., ‘That fish doesn’t want to be caught’ ‘Your brother doesn’t like tomato sauce, does he?’).

No internal state talk

All comments not containing internal state terms.

Table 2

Descriptive Statistics for All Variables

	Mean (SD)	Range
<i>Observation-based mind-mindedness at 44 months</i>		
Solicited child involvement	50.82 (43.92)	-61–169
Adaptive communication	35.08 (42.12)	-19–245
Internal state talk	20.68 (12.52)	1–58
<i>Established measures of mind-mindedness</i>		
Appropriate mind-related comments at 8 months (%)	5.34 (3.64)	0–18.67
Mental descriptions 44 months (%)	40.76 (25.55)	0–1
Mental descriptions 61 months (%)	42.34 (25.77)	0–1
<i>Control variables</i>		
Maternal Sensitivity	17.96 (2.71)	9–21
Total behavioral difficulties 44 months	10.15 (5.20)	1–30
Socioeconomic status	34.00 (14.03)	11–66
<i>Child variables at 51 months</i>		
Theory of mind	3.03 (1.75)	0–6
Emotion understanding	34.93 (5.78)	14–44
Standardized verbal ability	103.20 (12.99)	43–132
<i>Child variables at 61 months</i>		
Theory of mind	4.02 (1.67)	0–6
Emotion understanding	6.12 (2.02)	1–10

Table 3

Bivariate Correlations (Pearson's r) for All Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Solicited child involvement													
2. Adaptive communication	.68***												
3. Internal state talk	.74***	.63***											
4. Appropriate MRC	.29***	.26***	.33***										
5. Mind-minded descriptions 44m	.29***	.18*	.20*	.23**									
6. Mind-minded descriptions 61m	.29***	.17*	.20*	.16*	.22**								
7. Child ToM 51m	.21**	.14	.24**	.24**	.18*	.17*							
8. Child emotion understanding 51m	.37***	.26***	.39***	.29***	.17*	.19*	.47***						
9. Child ToM 61m	.25***	.12	.23**	.14	.14	.13	.53***	.47***					
10. Child emotion understanding 61m	.36***	.24**	.29***	.29***	.19*	.16*	.37***	.40***	.41***				
11. Child verbal ability	.25***	.10	.20*	.18*	.23**	.15	.40***	.51***	.43***	.47***			
12. Maternal sensitivity	.51***	.36***	.48***	.26***	.11	.22**	.24**	.28***	.27***	.22**	.11		
13. Behavioral difficulties	-.37***	-.22**	-.27***	-.21**	-.14	-.22**	-.22**	-.34***	-.21**	-.19*	-.23**	-.23**	
14. SES	.43***	.23**	.46***	.16	.29***	.10	.20**	.32***	.29***	.27***	.32***	.31***	-.34***

*** $p < .001$, ** $p < .01$, * $p < .05$

Note: MRC = mind-related comments; ToM = theory of mind; SES = socioeconomic status

Figure Captions

Figure 1. Flow chart summarizing the coding procedure for observation-based mind-mindedness at age 44 months.

Figure 2. Structural Equation Model showing predictors of the latent factor of mind-mindedness.

Note: SES = socioeconomic status; SDQ = Strengths and Difficulties Questionnaire total; AMRC = appropriate mind-related comments; MM = mind-mindedness; Solicit = Solicited child involvement; Comm = Adaptive communication; Internal = Internal state language; Describe = describe-your-child mind-mindedness; AMRC = appropriate mind-related comments.

Figure 3. Path analysis showing pathways from mothers' appropriate mind-related comments to children's age-4 mentalizing abilities. *Note:* BPVS = British Picture Vocabulary Scale; SES = socioeconomic status; Sens = maternal sensitivity; SDQ = Strengths and Difficulties Questionnaire total; AMRC = appropriate mind-related comments; MM = latent variable of observation-based mind-mindedness at 44 months; Solicit = Solicited child involvement; Comm = Adaptive communication; Internal = Internal state language; EU = emotion understanding; ToM = theory of mind.