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False belief understanding in maltreated children

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Abstract
False belief understanding was investigated in maltreated ($N = 203$), low socioeconomic status (SES) nonmaltreated ($N = 143$), and middle SES nonmaltreated ($N = 172$) 3- to 8-year-old children. Contrasts among the three groups provided an opportunity to examine the impact of family contextual influences on theory of mind development. Specifically, child maltreatment served as an "experiment of nature" in order to elucidate theory of mind abilities. Two false belief tasks and language assessments were administered. Among children with a verbal mental age of 49 months or greater, maltreatment was related to delays in the development of theory of mind, beyond the influence of chronological age and SES. The occurrence of maltreatment during the toddler period, onset during the toddler years, and physical abuse were features of maltreatment associated with delay in the development of theory of mind. Findings are discussed in terms of the influence of harsh caregiving on the development of theory of mind. Implications for the understanding of normal developmental processes are highlighted.

During the course of the past two decades, research on the development of a "theory of mind," the ability to reflect upon and infer the entire range of one's own and others' mental states that cause action, has burgeoned (see, e.g., Astington, 1993; Astington, Harris, & Olson, 1988; Baron–Cohen, 1995; Leslie, 1987; Perner, 1991; Wellman, 1990; Wellman, Cross, & Watson, 2001). The advances that have occurred in the understanding of the development of a theory of mind have emanated from investigations conducted within a number of disciplines, including cognitive neuroscience, developmental psychology, developmental psychopathology, and primatology (e.g., see chapters in Baron–Cohen, Tager–Flusberg, & Cohen, 2000).

In this study we examine false belief understanding in a large, representative sample of 3- to 8-year-old maltreated children. Our goal is to ascertain whether child maltreatment, as an "experiment of nature," affects the development of this aspect of theory of mind. Additionally, we seek to discover the extent to which the investigation of false belief in maltreated children can contribute to the understanding of theory of mind in normally developing children.

Considered to be one of the quintessential human characteristics (see, e.g., Povinelli & Prince, 1998; Tomasello & Call, 1997), the ability to attribute beliefs, desires, emotions, and intentions to people is generally achieved by most normally developing children from middle-class backgrounds by approximately 4 years of age (Jenkins & Astington, 1996; Wellman et al., 2001). A number of investigators have demonstrated that language is funda-

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mental to the development of a theory of mind (Astington & Jenkins, 1999; Jenkins & Astington, 1996; see also de Villiers, 2000). In normally developing children, a theory of mind is achieved during the major period of language acquisition that occurs by age 4. Since the publication of Wimmer and Perner's (1983) initial research demonstrating that false belief states made it difficult for preschoolers to predict the actions of others, scientific investigations of false belief understanding have become one of the predominant foci for researchers interested in the development of children's theory of mind.

The development of false belief understanding, the ability to make inferences about what other persons believe to be the case in a specific situation, is a capacity regarded as a critical component of mature social skills and thought (Perner, 1991; Wellman, 1990). Possessing the knowledge that different individuals can have different thoughts about the same situation is an important achievement that makes it possible to predict what other persons will do across a variety of scenarios. As such, false belief understanding has been conceived as a hallmark of a representational theory of mind (Perner, 1991). Although young children have knowledge about mental states as early as the second year of life, they fail to comprehend representational states necessary in order to infer the thoughts of others until age 4. This conceptual advance has been described as a shift from a situation-based to a representation-based understanding of behavior (Perner, 1991). Moreover, the acquisition of false belief understanding by age 4 is a well-replicated and remarkably robust experimental finding (Wellman et al., 2001).

In the normal development literature, there is growing evidence for the ability to attribute mental states to others from the second year of life onward (Bretherton, McKnew, & Beeghly–Smith, 1981). Children's theory of mind development undergoes major conceptual changes in the early years of life. Bretherton and colleagues (1981) contend that theory of mind is first evident when language acquisition begins at the end of the first year, in shared reference and joint attention (see also Bates, 1976). Olson (1988) argues that the development of theory of mind is dependent upon the acquisition of a language for talking about mental states.

The ability to talk about feelings and additional internal states of self and other reflects children's emerging self-awareness and self–other individuation (Beeghly & Cicchetti, 1994; Cicchetti & Beeghly, 1987). These capacities, indexed through the production of internal state (IS) words, emerge in the second year and increase dramatically during the third year and beyond (Bretherton & Beeghly, 1982; Bretherton et al., 1981). The ability to discuss the internal states of self and other is thought to underlie the regulation of social interaction (Cicchetti, Ganiban, & Barnett, 1991). Not only are there increases in the diversity of young children's IS lexicons over the early years of life, but the range of social agents (e.g., toys, photographs, other persons) to whom IS are imputed also burgeons (Beeghly & Cicchetti, 1994, 1997). Furthermore, children's use of IS words becomes increasingly abstract, decentered, and decontextualized over these early years (Bretherton, 1991; Bretherton et al., 1981).

It is important to note that the IS words of young children do not possess their full adult meaning, but rather appear to be based on concrete, observable reports of experience or behavior (Gopnik & Astington, 1988). Moreover, the IS words of young children refer primarily to those words that have explicit reference to internal states rather than to words that have implicit connotations of emotion, motivation, or intention (Bromley, 1977). Nonetheless, as more advanced conceptual and linguistic abilities emerge during the second and third years, children increasingly employ IS words in appropriate contexts and to discuss the states of nonpresent persons, as well as the causes and consequences of internal states for self and other (Beeghly & Cicchetti, 1994; Bretherton & Beeghly, 1982; Bretherton, Fritz, Zahn–Waxler, & Ridgeway, 1986).

Advances in other developmental domains co-occur with IS. These include an increased production of self-descriptive utterances (Kagan, 1981); the emergence of a growing empathic concern for others (Zahn–Waxler, Radke–Yarrow, Wagner, & Chapman, 1992); the por-

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trayal of active agency and social roles during pretend play with small figures (Leslie, 1987; Piaget, 1962; Watson & Fischer, 1977); the emergence of the "self-conscious" emotions of guilt, shame, and pride (Lewis, Sullivan, Stanger, & Weiss, 1989); and the development of more general advances in symbolic maturity, such as the ability to talk in sentences and increased lexical growth (Bloom, 1991; Werner & Kaplan, 1963).

Moreover, maternal language to toddlers about internal states has been demonstrated to mirror their children's abilities and becomes increasingly other-oriented as children manifest growth in linguistic and conceptual maturity (Beeghly, Bretherton, & Mervis, 1986; Dunn, Bretherton, & Munn, 1987). Including toddlers in family discussions about emotions and internal states is considered to be one pathway whereby children acquire and refine an IS lexicon (Dunn et al., 1987). Moreover, such conversational interchanges facilitate the establishment of close relationships by encouraging toddlers to share their experiences and feelings and to negotiate misunderstanding and conflicts (Dunn et al., 1987). In a longitudinal study, Dunn, Brown, Slomkowski, Tesla, and Youngblade (1991) found that individual differences in the amount of family discussions about feeling and emotion states were stable over time and predicted young children's understanding of other peoples' feelings and beliefs, even when children's language skills were controlled analytically.

Furthermore, Ruffman, Slade, and Crowe (2002) found that mother's use of mental state language between their child's third and fourth birthdays was correlated with the subsequent development of theory of mind. Likewise, Meins, Fernyhough, Russell, and Clark–Carter (1998) discovered that maternal "mind-mindedness" (i.e., mothers' tendency to focus upon their children's independent mental states) facilitated their children's development of theory of mind. Specifically, Meins et al. (1998) found that maternal sensitivity and use of mental attributes to describe their children at age 3 related to their false belief understanding at age 4. In related research, two separate investigations have demonstrated that securely attached children had better false belief performance at age 5 (Symons & Clark, 2000) and possessed advanced mentalizing abilities at that age (Meins et al., 1998) than did youngsters who were insecurely attached.

In addition to the numerous investigations that have been conducted on the normal development of a theory of mind, a significant amount of research has been carried out with atypical children, especially those with autism. Recent years have witnessed an increase in studies examining other atypical populations, including children with Down syndrome and children with mental retardation of undifferentiated etiology. Because these groups of children also often have neuropsychological, cognitive, and linguistic delays (Cicchetti & Beeghly, 1990; Fowler, 1998; Pennington & Bennetto, 1998), they have often been utilized as comparisons for children with autism in order to ascertain whether theory of mind deficits are specific to a particular group of children or occur more generally in high-risk youngsters (Yirmiya, Erel, Shaked, & Solomenica–Levi, 1998). Finally, the development of a theory of mind in youngsters with sensory deficits, such as children with deafness, has begun to be examined. The investigation of all of these aforementioned groups of atypical children, each of which is an experiment of nature, has made important contributions to the understanding of the development of a theory of mind.

Children with autism exhibit great difficulty in shifting their perspective to judge what another person might think. Rather, autistic children report what they themselves know (Baron–Cohen, 1995, 2000; Baron–Cohen, Leslie, & Frith, 1985). Happe (1995) found that the average verbal mental age (VMA) of children with autism passing second-order theory of mind tasks, those in which a child must infer the mental states of more than one person, was approximately 9 years of age. No child with autism who had a VMA of less than 5.5 years passed these second-order theory of mind tests. Even with first-order theory of mind tests (such as false belief tasks), which require a child to infer the mental states of just one other person, the severe social disconnectedness apparent in even high-functioning individuals with autism is thought to

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occur due to a serious impairment in their ability to construe persons in terms of their inner mental lives (Baron–Cohen et al., 2000). In fact, if one includes joint attention difficulties, then theory of mind deficits appear to be occurring by the first year of life in children with autism (Mundy & Sigman, 1989).

A number of discrete cognitive modules have been invoked to explain the performance deficits of children with autism versus normally developing children on theory of mind tasks (Baron–Cohen, 1995; Leslie, 1987). These theoretical viewpoints support the argument that neurobiological factors facilitate the emergence of theory of mind abilities in normally developing children and cause a deficit in theory of mind in children with autism (Baron–Cohen, 1995; Baron–Cohen et al., 2000). According to these nativist modular theories, children with autism are likely to have specific neurobiological anomalies that impair their ability to represent mental states. Moreover, these neurobiological aberrations also may bring about the deficits in language, imagination, and social functioning that constitute many of the core aspects of the diagnosis of autism (American Psychiatric Association, 1994; Baron–Cohen, 1995; Baron–Cohen et al., 2000).

Whereas neurobiological deficits have been implicated in theory of mind deficits in children with autism, features of mother–child communication patterns have also been theorized to contribute to impairments in their false belief understanding. For example, Tager–Flusberg (1993) found fewer references to mental states and to appeals for joint attention in dialogues between mothers and their children with autism. These results suggest that the neurobiological deficits of children with autism greatly impair their ability to reflect upon their own and other's mental states and lead mothers to make minimal use of such communications in their conversations with their children with autism. Alternatively, it is conceivable that the paucity of mental state language utilized by the mothers of children with autism may exacerbate an innate neurobiologically based impairment in mental state language in children with autism.

Individuals with Down syndrome, as well as those with mental retardation of undifferentiated etiology, also have been found to fail theory of mind tasks (Yirmiya et al., 1998). The inclusion of children with mental retardation in studies of false belief understanding reveals that theory of mind deficits are not specific to individuals with autism. However, the theory of mind abilities of persons with autism are more severely impaired than is the case for individuals with mental retardation, regardless of their etiologies (Yirmiya et al., 1998).

Children with Down syndrome have been shown to produce significantly fewer IS words and fewer IS word types than their MA-matched normally developing counterparts (Beeghly & Cicchetti, 1997). Children with Down syndrome also were less likely to attribute internal states to themselves and were more context bound in their use of IS language. Self-reflection requires a fair degree of metacognitive ability that may be quite difficult for children with Down syndrome given their impairments in abstract thought. Furthermore, children with Down syndrome also differed from MA-matched normally developing children in the semantic content of their IS language, with proportionately higher rates of affective words and lower rates for words about volition, ability, and cognition (Beeghly & Cicchetti, 1997). In a related finding, mothers of children with Down syndrome use proportionately fewer utterances with IS references, fewer different IS words, and fewer words about cognition with children with Down syndrome than mothers of cognitively comparable normally developing children (Beeghly et al., 1986). Whatever the source, diminished maternal language about internal states may lead to a restricted or disorganized IS lexicon in children with Down syndrome and to fewer dyadic exchanges about feeling states. It is interesting that although the performance of children with Down syndrome on theory of mind tasks, including false belief, is better than that of individuals with autism, it is lower than the performance of mentally retarded children with undifferentiated etiologies (Yirmiya et al., 1998). It is unclear whether the observed theory of mind deficits are a consequence of the effects of the Down

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syndrome genotype on individual development or whether these theory of mind deficits also may be exacerbated by parental linguistic input.

Research on theory of mind development in children with deafness also has shed light on the role that factors other than neurobiological deficits may play in the acquisition of the ability to reflect upon one's own and others' mental states. Specifically, the results of several investigations of children with deafness suggest that theory of mind deficits also may be due to the environmental influence of a lack of exposure to conversations about mental states (Peterson, 2002; Peterson & Siegal, 1995, 1999; Woolfe, Want, & Siegal, 2002).

In a review of 11 separate investigations of false belief understanding in diverse samples of signing, profoundly deaf children, Peterson and Siegal (2000) found that the results of these studies consistently revealed that the vast majority of late-signing deaf children who had resided in hearing families revealed substantial deficits in their theory of mind understanding, despite having normal intelligence and social responsiveness and possessing no clinical impairments that are integral to a diagnosis of autism. Peterson and Siegal (2000) conclude that these observed delays are not a sequelae of deafness per se; rather, these authors propose that it is deafness, in conjunction with growing up in the context of a hearing family that cannot provide the normal flow of conversation necessary for developing false beliefs, including exposure to parental mental state language.

In support of these assertions, Peterson and Siegal (2000) note that native signers (i.e., deaf children who have access to other native speakers of sign language at home) perform consistently better on false belief tasks than late signing deaf children from hearing families. These latter children performed as poorly as autistic children on false belief tasks (Peterson & Siegal, 1999). Furthermore, oral deaf children who used speech in their interactions with their hearing family members did not differ significantly from native signers in their false belief performance, suggesting that the specific modality of spontaneous communication that is utilized plays a minimal role in the acquisition of a theory of mind (Peterson & Siegal, 1999). In keeping with the concept of equifinality (Cicchetti & Rogosch, 1996), Peterson and Siegal (2000) contend that there may be other routes to deficits in the theory of mind understanding than the innately damaged neurobiological module proposed to explain the severe problems that children with autism exhibit on false belief tasks. Even though neurobiological deficits are involved in the impaired development of false belief understanding in children with autism, for other populations (e.g., deafness) a critical level of conversational input may be essential to trigger the normal neurological development necessary to develop theory of mind (Peterson & Siegal, 1999).

The investigation of children with histories of maltreatment provides yet another opportunity to discover how experience can exert an impact upon false belief understanding. The context within which parenting is provided in maltreating homes is characterized by chaos, chronic stress, and disorganization (Cicchetti & Lynch, 1995). Consequently, the erratic and inconsistent nature of parenting in maltreating homes makes it extremely difficult for the children to accurately predict parental behavior (Rogosch, Cicchetti, Shields, & Toth, 1995). This may be especially true for children who experience sexual and/or physical abuse (Rogosch et al., 1995).

Maltreating parents possess limited personal resources, exhibit less parental sensitivity, have less empathy for their children, and have a greater self-focus than child focus (Howes & Cicchetti, 1993; Lyons–Ruth, Repacholi, McLeod, & Silva, 1991; Newberger & Cook, 1983; Rogosch et al., 1995). Moreover, the emotional instability of maltreating parents may create considerable ambiguity or confusion for their children in understanding parental expressions of emotion (Rogosch et al., 1995).

Maltreated children exhibit a number of impairments in their psychological development that bode poorly for their developing a theory of mind. There is little joint attention and shared reference in the interactions of maltreating mothers and their children (Ro-

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gosch et al., 1995). Moreover, maltreated infants develop insecure attachment relationships with their caregivers (Barnett, Ganiban, & Cicchetti, 1999; Carlson, Cicchetti, Barnett, & Braunwald, 1989), exhibit self-system anomalies (Cicchetti, 1991; Fischer & Ayoub, 1994; Toth, Cicchetti, Macfie, & Emde, 1997), and manifest deficits in the use of mental state language (Beeghly & Cicchetti, 1994; Cicchetti & Beeghly, 1987), including problems in the differentiation of self and other via IS language and excessive use of negative self-conscious emotions (Allessandri & Lewis, 1996). Positive functioning on each of these developmental domains has been implicated in the development of theory of mind. Clearly, the confluence of parental and individual developmental characteristics place maltreated children at increased risk for deficits in false belief understanding.

To date, the bulk of research on theory of mind development has been conducted with middle and upper middle income children from well-educated families. Thus, despite significant advances in understanding the normative development of a theory of mind, attention to how contextual features might affect its development has been lacking. In that aspects of the family environment such as family discourse about IS have been linked to the development of theory of mind, it is not unlikely that family socioeconomic status (SES) also exerts important influences on the emergence of these abilities. However, investigations of the links between family demographics and theory of mind have been somewhat mixed. Whereas Cutting and Dunn (1999) found that parental occupational class and mother's education level contributed to false belief understanding, independent of language ability, in an economically diverse group of children (see also Pears & Moses, 2003), other investigations have found no association between socioeconomic status and theory of mind or determined that the association was driven by language ability (Hughes, Deater–Deckard, & Cutting, 1999; Murray, Woolgar, Briers, & Hipwell, 1999). Thus, further work is necessary in order to better clarify the effect of parental occupational and educational status on children's development of theory of mind.

Additionally, parenting styles also might be expected to influence the emergence of theory of mind (Ruffman, Perner, & Parkin, 1998). For example, maternal use of power assertion parenting styles and/or physical punishment has been shown to be negatively related to false belief performance (Hughes et al., 1999; Pears & Moses, 2003). In marked contrast, however, Hughes et al. (1999) also found that severe discipline, as measured by observers' ratings of parental interviews, was positively associated with theory of mind, but only for boys. Dunn and colleagues (Dunn, Brown, & Beardsall, 1991) also found that mothers' use of controlling and intrusive discipline with the target child's siblings was found to correlate positively with understanding of false belief. In interpreting these findings, Dunn and colleagues suggest that by witnessing disagreements involving parents and siblings, children may learn that people have different and conflicting perspectives. Similarly, children who are disciplined harshly may learn that their parents have perspectives that are very discrepant from their own. Thus, the extant literature is mixed with respect to the role of parenting on children's theory of mind abilities. It is important that studies to date have not included caregiving that has been severe enough to be classified as maltreating. Therefore, the conduct of an investigation with children who have experienced maltreatment is expected to be especially informative in clarifying issues related to the role of caregiving in the development of a theory of mind.

In the present study, we hypothesize that children who have not attained a VMA of at least 49 months will be unlikely to demonstrate false belief understanding. For children demonstrating the requisite cognitive abilities, we expect to find the following:

1. Older chronological age (CA), indicative of longer experience in interpersonal interaction, will relate to increased likelihood of theory of mind development.

2. Socioeconomic disadvantage will contribute to delay in the development of false belief understanding. Furthermore, because

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both the maltreated and nonmaltreated low-SES comparison groups reside in poverty conditions, the inclusion of the low-SES nonmaltreated group can control for environmental deprivation co-occurring with maltreatment.

3. Child maltreatment will contribute to delays in the development of theory of mind over and above those associated with low-SES membership.

4. The developmental timing of maltreatment, particularly when it occurs during the period of self-development and self-other differentiation, will contribute to greater delays in the development of false belief understanding. Moreover, maltreatment that begins during these periods and persists over time will bring about delays in the development of theory of mind.

5. Specific maltreatment experiences, especially physical and sexual abuse, will contribute to delays in false belief understanding.

Method

Participants

The participants in this investigation included 518 children who ranged in age from 3 to 8 years. The sample comprised 203 low SES maltreated children, 143 low-SES nonmaltreated children, and 172 middle-SES nonmaltreated comparisons, all of whom lived at home with their biological parents. We specifically recruited children who were 3, 4, 5, 6, 7, and 8 years of age because of the empirical evidence that most 4-year-olds in middle class families demonstrate false belief understanding (e.g., Wellman et al., 2001; Wimmer & Perner, 1983) and to examine the emergence of metarepresentational skills in more at-risk youngsters. Table 1 provides a breakdown of the number of subjects, mean age, age range, and percentage of males of low-SES maltreated, low-SES nonmaltreated, and middle-SES nonmaltreated children in each of the six recruited CA levels. More maltreated children were recruited to increase statistical power in detecting differences across maltreatment dimensions. Participants were drawn from two separate larger investigations of children from low- and middle-SES backgrounds that were conducted in our laboratory; the measurement batteries of both investigations included theory of mind tasks. The samples of children were combined in order to provide normative data from representative samples of low- and middle-SES children and to allow for comparisons across socioeconomic groups.

Parents of all maltreated and low- and middle-SES nonmaltreated children provided informed consent for their child's participation, as well as consent for examination of any Department of Human and Health Services (DHHS) records pertaining to the family. Families of maltreated children were recruited from the DHHS and were representative of families receiving services at the Monroe County DHHS. Specifically, families identified as having a child between the ages of 3 and 8 years with a documented history of maltreatment were contacted by a DHHS liaison, who requested permission from consenting families for project staff to contact them regarding study participation. Determination of maltreatment status was based on detailed examination of Child Protective Service (CPS) and Preventive Services records at DHHS. These records contained descriptions of children's maltreatment histories based on information obtained from multiple informants familiar with the family (e.g., CPS workers, mothers, neighbors, teachers, physicians, and day-care providers). All existing DHHS records for these families were examined and coded by trained raters utilizing the Barnett, Manly, and Cicchetti (1993) nosological classification system for child maltreatment (described below).

Low-SES nonmaltreated children were recruited from families receiving public assistance (e.g., Aid to Families with Dependent Children or Temporary Assistance to Needy Families). These families were selected based on their similarity to the demographic characteristics of the maltreating families. Nonmaltreatment status was determined by confirmation through record searches of an absence of any CPS or Preventive Services records for

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Table 1. *Number of subjects* (n)*, mean age* (M) *and standard deviation* (SD)*, age range, and percent males in each of the recruited chronological age* (*CA*) *levels for low-SES maltreated, low-SES nonmaltreated, and middle-SES nonmaltreated children*

	Study Groups													
	Low-SES Maltreated					Low-SES Nonmaltreated					Middle-SES Nonmaltreated				
		Age (months)					Age (months)					Age (months)			
CA Level	*n*	*M*	*SD*	Age Range	Male (%)	*n*	*M*	*SD*	Age Range	Male (%)	*n*	*M*	*SD*	Age Range	Male (%)
3-year-olds	21	44.76	3.04	38.50–47.90	71.4	14	44.01	2.21	39.90–46.93	35.7	23	40.43	2.72	36.83–46.20	56.5
4-year-olds	40	54.95	3.77	48.00–59.83	62.5	22	54.96	3.04	48.13–59.30	63.6	29	52.13	2.38	48.93–58.53	51.7
5-year-olds	45	65.55	3.40	60.30–71.97	57.8	28	66.01	3.88	60.10–71.53	50.0	27	63.87	1.46	61.00–68.67	48.1
6-year-olds	35	77.22	3.17	72.43–83.50	60.0	31	76.55	2.98	72.27–83.20	51.6	33	75.86	1.39	73.40–79.33	42.4
7-year-olds	42	90.35	3.38	84.00–95.87	69.0	24	88.95	2.65	84.77–93.63	66.7	30	88.50	1.85	86.03–94.57	50.0
8-year-olds	20	101.39	2.35	97.10–105.20	75.0	24	101.02	3.16	96.10–109.57	54.2	30	100.88	2.48	97.47–107.93	53.3

Note: SES, socioeconomic status.

the family and further verified by maternal report. During maternal interviews to provide an additional screen for child maltreatment, mothers were queried regarding any family involvement with CPS or Preventive Services. Families were excluded from the nonmaltreatment group if there were any family history of DHHS involvement as indicated by record searches or maternal report. Throughout the course of the investigation, project staff monitored the DHHS registry at 6-month intervals to confirm the nonmaltreatment status of low-SES comparisons. Low-SES nonmaltreated families who were identified as maltreating subsequent to their enrollment in the study were excluded from the investigation ($n = 5$).

Middle-SES comparison participants were recruited through hospital birth records and fliers posted in libraries and community centers located in middle-class neighborhoods. Letters describing the study were sent to families who were identified as having a child between the ages of 3 and 8 years. Interested families were asked to contact research staff upon receiving a recruitment letter or seeing a study solicitation. Inclusion criteria for the middle-SES sample included families in which a parent had a minimum of a high school education, was gainfully employed, and was not reliant on public assistance.

Demographic characteristics. Low-SES maltreated and nonmaltreated families did not differ on a number of important demographic characteristics. The two groups were equivalent on child age, $M = 71.99$ months, $SD = 17.75$ versus $M = 74.17$ months, $SD = 18.15$, respectively; $t\ (344) = 1.24$, *ns*; child gender, 64.5 versus 54.5% male, respectively; $\chi^2\ (1) = 3.50$, *ns*; marital status, 36.9 versus 45.5% single, respectively; $\chi^2\ (1) = 2.54$, *ns*; ethnicity, 51.3 versus 60.8% African American, 40.1 versus 30.1% European American, 6.1 versus 7.0% Latino American, and 2.5 versus 2.1% other, respectively; $\chi^2\ (3) = 3.87$, *ns*; and average total family income, including welfare benefits, \$17,320 versus \$17,310, respectively; $t\ (330) = .00$, *ns*. In addition, both low-SES maltreated and nonmaltreated families had low scores on Hollingshead's (1975) four-factor index of social status, showing 82.6% of the families in the maltreated group and 73.9% of the nonmaltreated group families falling in the two lowest social strata, $\chi^2(1) = 3.67$, *ns*.

Middle-SES nonmaltreated families were predominantly European American (95.7%) and 94.5% of the mothers were married at the time of the investigation. Fifty percent of the children were boys and the average child age was 74.17 months ($SD = 18.15$). In addition, 34.8% of the families had total income levels that ranged between \$40,000 and \$60,000 and 46.0% had annual incomes greater than \$60,000. The children were from middle to upper middle SES households, with all families falling in the three highest social strata (Hollingshead, 1975).

Maltreatment characteristics. For all maltreated children, mothers were a perpetrator of at least one form of maltreatment. The abuse and neglect experiences of the maltreated sample were diverse. Approximately 11.0% ($n = 22$) of the children had been sexually abused, 31.0% ($n = 63$) had been physically abused, 75.9% ($n = 154$) had been emotionally maltreated, and 77.3% ($n = 157$) had been neglected. As such, the majority of maltreated children (68.0%, $n = 138$) had experienced two or more subtypes of maltreatment. The frequency of cases with only one maltreatment subtype was low, particularly for children who had been physically or sexually abused. For example, none of the children who were sexually abused exclusively experienced sexual abuse, and only 2.5% ($n = 5$) of children who experienced physical abuse were solely physically abused. The multiplicity of subtypes experienced by children in the maltreated sample is consistent with that reported in other samples of maltreated youngsters (Barnett et al., 1993; Cicchetti & Barnett, 1991; Manly, Kim, Rogosch, & Cicchetti, 2001).

The developmental period(s) during which the maltreatment occurred also was documented. This information was relevant for examining child age at the onset of maltreatment as well as chronicity, with maltreatment in multiple developmental periods considered "chronic" and maltreatment during only one

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developmental period considered "nonchronic." In the maltreated sample, 32% percent (n = 65) of the children had a nonchronic history of maltreatment experiences and 68.0% (n = 138) had a history of chronic maltreatment. With respect to the age of onset, almost two-thirds of the children (63.5%, n = 129) experienced maltreatment for the first time during infancy before 18 months of age. An additional 16.7% (n = 34) of the children had an onset of maltreatment during toddlerhood and the same percentage of children (16.7%, n = 34) had a preschool period onset. Finally, only 3% (n = 6) of the maltreated children experienced maltreatment for the first time during the school-age period. Due to the low frequency of maltreated children with a school-age onset, these children were excluded from all analyses involving age of onset of maltreatment.

Procedure

The present study, as stated previously, includes children who were drawn from two separate larger investigations. Although additional procedures and parent reports were obtained in these studies, only those relevant to the current investigation are presented. All children were brought into a laboratory assessment room that contained a small table and three chairs. Children were administered two false belief tasks and a language assessment. These tasks were conducted by two bachelor's level examiners who were unaware of study hypotheses and maltreatment status. During the false belief assessment, one examiner administered the tasks to the child, while the other recorded the child's responses. In a separate lab room, mothers completed a demographic interview. Sessions lasted approximately 45 min.

Measures

False belief tasks. The first task was a variant of Perner, Leekam, and Wimmer's (1987) unexpected-content "smarties" task (i.e., the Band-Aid task), in which a false belief was engendered by a box with deceptive content (see Jenkins & Astington, 1996). The examiner first visually presented a Band-Aid box that had several pictures of Band-Aids on its exterior, and the examiner asked the child, "What's in this box?" It was assumed that the child would guess that the box contained Band-Aids based on the box's clear visual cues and the child's familiarity with the object. In fact, all of the children in the sample correctly answered "Band-Aids." After the child guessed as to the contents of the box, the examiner opened the box and revealed the box's deceptive content, telling the child, "You know what? There are crayons in this box! So there *aren't* Band-Aids in the box after all. There are *crayons* in the box." After placing the crayons back inside the Band-Aid box, reestablishing its prior deceptive state, the examiner asked the child to identify the true contents of the box ("So what's *really* in the box?"). This question served as the task control question. The examiner repeated the control question until the child correctly identified the objects as crayons. This was done to ensure that after the deception was revealed to the child, he or she understood that the box contained crayons and not Band-Aids after all. Then, the child was asked two test questions. The first assessed the child's understanding of representational change ("When I first asked you, what did you say was in the box?") and the second measured his or her false belief understanding ("If your friend were here, and he/she had not seen this box before, what would he/she say was in the box?"). If the child reported that his or her friend would say that there were Band-Aids in the box *and* answered the task control question correctly when first asked, then he or she was scored as passing the false belief task. Children who reported that there were crayons in the box *and/or* answered the task control question incorrectly when first asked were scored as failing.

The other false belief task administered was an unexpected-content task used by Gopnik and Astington (1988) (i.e., a false belief book task), again with the intention of engendering a false belief by using a picture book with deceptive content. The examiner first visually presented the picture book to the child and said, "This book is special because some

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pages have holes in them so that you can only see part of the next page." The child was then shown a partially covered picture of a dog that displayed only the dog's right ear and was asked, "What's this?" The examiner then turned the page (removing the deceptive covering) to reveal to the child the full picture of the dog. The procedure was repeated a second time. This time the examiner displayed to the child a partially covered picture of a rabbit, again with only the rabbit's right ear showing. The child was asked to guess its identity. Then, the examiner removed the picture's deceptive covering and revealed the full picture of the rabbit to the child.

The third and final picture presentation served as the test condition. The child was shown a partially covered picture of what again appeared to be the ear of an animal and was asked to guess its identity. It was assumed that child participants would represent the object as an animal based on his or her exposure to the prior two picture presentations, and, in fact, all of the children in the study identified the deceptive object as some sort of animal (e.g., pig or cat). However, when the examiner turned the page to reveal the full picture of the object, the child discovered that the hole was actually revealing a petal of a flower and not the ear of an animal. The child was then asked to name the real identity of the object ("What is it really?" task control question). Again, it was expected that children would first represent the object as an animal with the deceptive covering in place, but would then represent the object as a flower once the covering was removed. Finally, after putting the picture back into its deceptive state (i.e., placing the deceptive covering back over the picture), the examiner asked the child the following false-belief test question: "If your friend were here and he/she had not seen this book yet, what would he/she say is on the next page *BEFORE* he/she turned this page?" The child was scored as passing the false belief task if he or she stated that the friend would say it was an animal or any other object other than its real identity *and* answered the task control question correctly. Children who reported that their friend would say it was a flower *and/or* answered the task control question incorrectly were scored as failing the task.

Language assessments and VMA estimates. Because language abilities have been shown to relate to theory of mind performance, language assessments were conducted with all participants. Children were administered either the Peabody Picture Vocabulary Test—Revised (PPVT-R; Dunn & Dunn, 1981), the Vocabulary subtest of the Wechsler Preschool and Primary Scales of Intelligence—Revised (WPPSI-R; Wechsler, 1989), or the Vocabulary subtest of the Wechsler Intelligence Scale for Children—Revised (WISC-III; Wechsler, 1991). Low-income maltreated and nonmaltreated children were administered the PPVT-R, and middle-income nonmaltreated children were administered the Vocabulary subtest from either the WPPSI-R or WISC-III, depending on the CA of the child. Different language assessments were administered because study participants were drawn from two separate studies with different language assessment batteries.

The PPVT-R is an individually administered, multiple-choice test designed to assess the receptive vocabulary skills of persons aged 2.5 through 90+ years. Prior research using the PPVT-R has shown it to be both valid and reliable (e.g., split-half reliability = .81, test–retest reliability = .72; see Williams & Wang, 1997).[1] The correlations between the PPVT-R and the Vocabulary subtests of the WPPSI-R and WISC-R (the predecessor to the WISC-III) are .40 and .70, respectively (Dunn & Dunn, 1997).

The WPPSI-R and WISC-III are widely used, individually administered tests of intelligence for children aged 3–7 and 6–16, respectively. The Vocabulary subtests of these instruments measure children's verbal expressive abilities, verbal concept formulation skills, and accumulated verbal learning abilities. Both the WPPSI-R and WISC-III Vocabulary subtests have been demonstrated to be psy-

1. Although a more updated version of the PPVT now exists (i.e., PPVT-III), the current investigation began before the most recent revision of this measure was completed.

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chometrically sound measures of children's language development (WPPSI-R: internal consistency reliability = .84, test–retest reliability = .75, concurrent validity with Stanford–Binet Form L-M = .82; WISC-III: internal consistency reliability = .87, test–retest reliability = .89, concurrent validity with Stanford–Binet 4th ed. = .78; Groth–Marnat, 1997; Sattler, 1988, 1992; Sattler & Atkinson, 1993).

VMA equivalent scores were derived from PPVT-R and WPPSI-R and WISC-III Vocabulary subtest raw scores. Because of child attention and behavioral difficulties that interfered with test administration, VMA scores are not available for 10 of the participants and these children were excluded from analyses involving the VMA. Children's VMA scores were used in subsequent analyses.

Maltreatment classification. The Maltreatment Classification System (MCS; Barnett et al., 1993) was used to delineate diverse features of child maltreatment that individual children had experienced. Cicchetti and Rizley (1981) argued that the phenomenology of child maltreatment is heterogeneous, involving different types and patterns of maltreatment with diverse etiologies, developmental sequelae, and responses to treatment. Accordingly, Cicchetti and Barnett (1991) advocated the development of a nosological system to characterize the substantial variability in experience among maltreated children. The MCS utilizes DHHS records detailing investigations and findings regarding maltreatment occurrences in identified families. Rather than relying on official designations and case dispositions, the MCS codes all information available on a designated family from DHHS records, making independent determinations of maltreatment experiences. In particular, the MCS codes all incidents that have been documented in DHHS records and, based on operational criteria, designates the subtypes of maltreatment individual children have experienced (i.e., sexual abuse, physical abuse, neglect, and emotional maltreatment), the severity of each type of maltreatment, the developmental periods in which maltreatment occurred (i.e., infancy, toddlerhood, preschool, or school-age period), the frequency of occurrence within and across developmental periods, and the perpetrators of maltreatment. In this study, coding of DHHS records was conducted by trained research assistants, doctoral students, and Ph.D. level psychologists; adequate reliability was obtained (weighted κ = .86–.98). Prior investigations using the MCS have shown it to be reliable and valid in classifying maltreatment incidents and in differentiating among maltreatment subtypes (Bolger & Patterson, 2001; Bolger, Patterson, & Kupersch-midt, 1998; Manly, Cicchetti, & Barnett, 1994; Manly et al., 2001; Smith & Thornberry, 1995).

For the present investigation, maltreatment subtypes and developmental periods during which maltreatment occurred were coded and examined. The following operational criteria were used to classify subtypes of maltreatment. *Sexual abuse* involves any attempted or actual sexual contact between a child and caregiver for purposes of the caregiver's sexual satisfaction or financial benefit. Acts vary from exposure to pornographic material or adult sexual activity to sexual touching and fondling, attempted penetration, forced intercourse, and prostitution of the child. *Physical abuse* involves the infliction of physical injury on a child other than by accidental means (e.g., beating the child causing bruises, welts, broken bones, burns, choking). Injuries may range from minor and temporary to permanently disfiguring. *Neglect* involves failure to provide for children's basic physical needs (i.e., for adequate food, clothing, shelter, medical treatment), lack of supervision (e.g., leaving child without adult supervision, exposure to firearms, leaving child in the care of dangerous caregivers), or moral-legal or educational neglect (e.g., exposing the child to criminal activity, failure to send a child to school). Finally, *emotional maltreatment* involves extreme thwarting of children's basic emotional needs for psychological safety and security, acceptance and self-esteem, and age-appropriate autonomy. Examples of emotional maltreatment, in terms of increasing severity, may involve belittling or ridiculing the child, using fear and intimidation, blaming the child inappropriately, extreme negativity and hostility, exposure to severe marital violence, abandoning the child, confining the child in an enclosed space, and suicidal and homicidal threats.

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With respect to developmental periods of maltreatment, the MCS differentiates whether maltreatment events occurred during *infancy* (under 18 months), *toddlerhood* (18–35 months), the *preschool* period (3–5 years), and *early school age* (6–8 years). Developmental timing allows for determination of child age at the onset of maltreatment as well as chronicity of maltreatment in terms of the number of developmental periods in which maltreatment was known to have occurred.

Results

Overview of data analytic strategy

First, a detailed assessment of the pattern of scores across the two false belief tasks is provided. Second, the presence of a linguistic ability threshold effect (discussed below) on false belief performance is assessed. Third, the impact of maltreatment, SES, CA, and VMA on false belief understanding is examined. Fourth, the unique effect of maltreatment in the prediction of children's false belief performance above and beyond the impact of CA and SES in children with a VMA of 49 months or greater is assessed. Fifth, the different dimensions of maltreatment (developmental timing, age period of onset, chronicity of occurrence, and subtypes) and their unique impact on false belief understanding are examined.

False belief performance patterns

Prior to examining factors that predict false belief understanding, children's performance on the two false belief tasks was assessed in accordance with Jenkins and Astington's (1996) analytical approach. In the total sample, 64.7% ($n = 335$) of the children passed the Band-Aid task and 66.6% ($n = 345$) passed the false belief book task. Looking at performance patterns across the two tasks, 52.9% ($n = 274$) of the total sample passed two out of the two tasks, 25.5% ($n = 132$) passed one out of the two tasks, and 21.6% ($n = 112$) passed none of the false belief tasks. The agreement between the two false belief tasks in the total sample was 74.5%, which is lower than that reported by Jenkins and Astington who used the same tasks but whose sample included only children from middle-income households (reported agreement = 88%).

With respect to pass rates of false belief control questions, 97.4% of all task control questions were answered correctly. Specifically, 96.3% of the children in the total sample passed the Band-Aid task control question and 98.5% passed the false belief book control question. The high passing rate of false belief control questions indicates that the majority of the children were able to recall the factual content of each false belief task presented

We evaluated whether the two false belief tasks were differentially related to CA and to VMA in order to determine if there was any evidence that the two tasks differed in difficulty level. Correlations between CA and performance on the Band-Aid and Book tasks were .46 and .48 (ps $< .001$), respectively. Similarly, correlations between VMA and performance on the Band-Aid and Book tasks were .47 and .50 (ps $< .001$), respectively. Thus, the two false belief tasks demonstrated equivalent relations with CA and VMA and did not appear to differ in difficulty, consistent with the findings of Jenkins and Astington (1996).

Some prior investigations have used a summed measure of children's total false belief scores across tasks as the outcome variable (e.g., Astington & Jenkins, 1999; Jenkins & Astington, 1996; Ruffman, Perner, Naito, Parkin, & Clements, 1998). In contrast, the present study utilized a stringent *all-pass* criterion in determining children's false belief performance. Happe (1995) has suggested that this more stringent criterion reduces the potential of achieving pass-level performance by chance. Thus, only children who passed both false belief tasks (2/2) were coded as successfully demonstrating false belief understanding (52.9%, $n = 274$). Those children passing only one (1/2) or none (0/2) of the false belief tasks were coded as failing to demonstrate false belief understanding adequately, exhibiting a less advanced or underdeveloped conceptualization of others' beliefs (47.1%, $n = 244$). The false belief all-pass criterion score is the false belief outcome variable used throughout the remainder of this report.

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Linguistic ability threshold effect

Next, we sought to determine whether there was a threshold of verbal ability necessary for passing the false belief all-pass criterion. Jenkins and Astington (1996) identified a linguistic ability threshold effect in a sample of 3- to 5-year-old children from well-educated, middle-SES families. Specifically, they reported that children with a language age equivalent score of 49 months or higher were much more likely to pass false belief tasks than children who had a language age equivalent score below 49 months. To assess whether a 49-month-old linguistic ability threshold effect was present in the current sample, children's VMA scores were dichotomized into two groups. Children with VMA scores less than 49 months were coded as 0 and children with VMA scores of 49 months or greater were coded as 1. Consistent with that reported by Jenkins and Astington, a VMA threshold effect of 49 months was found. Of those children in the total sample who successfully demonstrated false belief understanding (i.e., passed the false belief all-pass criterion), 91.8% had a VMA of 49 months or greater. Moreover, among children with a VMA of less than 49 months, 85.9% failed to demonstrate false belief understanding. A chi-square analysis was conducted to determine whether children with a VMA of 49 months or greater were more likely to pass the false belief criterion than youngsters with a VMA of less than 49 months. The chi-square value was highly significant, χ^2 (1) = 122.09, $p < .001$, lending support for Jenkins and Astington's 49-month-old linguistic ability threshold effect in the present sample. Nevertheless, it is noteworthy that 31.5% of children with a VMA of 49 months or greater did not meet the false belief all-pass criterion, indicating that other factors, in addition to VMA, contribute to performance.

Association between false belief all-pass criterion performance and study predictor variables

Because language development, CA, and SES have been linked empirically to children's false belief understanding (e.g., Astington & Jenkins, 1999; Cole & Mitchell, 1998; Cutting & Dunn, 1999; Jenkins & Astington, 1996; Perner et al., 1987), these variables, in addition to maltreatment status, were examined to determine their relation to children's false belief performance in the present sample. Table 2 provides correlations among the false belief all-pass criterion score, maltreatment status (maltreated vs. nonmaltreated), SES (low vs. middle), CA, and VMA. Maltreatment, SES, CA, and VMA each demonstrated significant relations with false belief performance.

We also determined whether child gender was related to false belief understanding. Child gender had no significant effect on individual false belief tasks, Band-Aid task: χ^2 (1) = 2.66, *ns*; false belief book task: χ^2 (1) = 2.54, *ns*; false belief all-pass criterion performance: χ^2 (1) = 2.04, *ns*. Therefore, gender was not considered further in subsequent analyses.

Unique effect of maltreatment on false belief performance

We next evaluated whether maltreatment related uniquely to false belief all-pass criterion performance above and beyond the influences of VMA, CA, and SES. Based on the above identified 49-month-old VMA threshold effect for the total sample, only those children with a VMA of 49 months or greater ($N = 359$: 128 low-SES maltreated, 94 low-SES nonmaltreated, 137 middle-SES nonmaltreated) were included in the analysis (as well as in subsequent analyses) as a means of controlling for the influence of language development on children's false belief understanding. False belief understanding was then compared across the three study groups, and significantly different rates of meeting the all-pass criterion were observed, χ^2 (2) = 15.10, $p < .001$. Group contrasts revealed that significantly fewer maltreated children (56.3%) demonstrated false-belief understanding than low-SES nonmaltreated children, 71.3%, χ^2 (1) = 15.23, $p < .025$, and middle-SES nonmaltreated children, 78.1%, χ^2 (1) = 14.78, $p < .001$. The low-SES nonmaltreated children and the middle-SES nonmaltreated children did not significantly differ, χ^2 (1) = 1.40, *ns*.

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Table 2. *Pearson product moment correlations among false belief all-pass criterion score and study predictor variables*

	1	2	3	4	5
1. False belief all-pass criterion	—	—	—	—	—
2. Maltreatment	−.18***	—	—	—	—
3. Socioeconomic status	.19***	−.57***	—	—	—
4. Chronological age	.54***	−.02	−.03	—	—
5. Verbal mental age	.56***	−.27***	.31***	.75***	—

***$p < .001$.

Table 3. *Unique effects of maltreatment on false belief performance, controlling for chronological age (CA) and socioeconomic status (SES) for those children with a verbal mental age of 49 months or greater*

	False Belief All-Pass Criterion			
	χ^2	*B*	Wald's *F*	$p <$
Step 1 ($df = 2$)	66.92***			
CA		.06	47.39	.001
SES		1.20	17.59	.001
Step 2 ($df = 1$)	5.14*			
Maltreatment status		−.70	5.01	.05

*$p < .05$. ***$p < .001$.

Additionally, a hierarchical logistic regression was performed on the VMA restricted sample to examine whether the effect of maltreatment on children's false belief performance remained once CA and SES had been taken into account. CA and SES were entered simultaneously into the regression equation at Step 1 of the analysis, followed by maltreatment status at Step 2. Results revealed that after controlling for the effects of CA and SES, maltreatment status retained a significant regression coefficient ($B = -.70$, $p < .05$) in predicting children's false belief understanding (see Table 3). Thus, maltreatment contributes significantly to the prediction of false belief performance above and beyond the influences of CA and SES for those children with a VMA of 49 months or greater.

Effects of developmental timing, onset, and chronicity of maltreatment

Next, we sought to examine whether different features of maltreatment were related to differential performance on the false belief tasks. A series of analyses was performed to determine whether the developmental timing, onset, and chronicity of children's maltreatment experiences each influenced false belief performance and whether their effects remained after the influences of CA and SES were considered. Again, only those children with a VMA of 49 months or greater were considered.

Developmental timing of maltreatment. First, we evaluated whether the occurrence of maltreatment during each of four developmental periods influenced false belief understanding. Four variables were generated reflecting the presence versus absence of maltreatment during infancy, toddlerhood, the preschool period, and the early school-age years. Then, a series of 2 (presence/absence of maltreatment in developmental period) × 2 (pass/fail false belief all-pass criterion) chi squares was performed to assess whether the occurrence of maltreatment in each of the four developmental periods impacted children's false be-

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lief understanding. A Bonferroni based correction was applied to control for experiment wise error by dividing the standard .05 alpha level by the number of planned comparisons (Jaccard & Guilamo–Ramos, 2002). As such, the p values for the four 2×2 chi squares we conducted needed to exceed .01 to be considered significant. Results revealed that the presence of maltreatment in the toddler, χ^2 (1) = 19.52, $p < .001$, and preschool, χ^2 (1) = 22.95, $p < .001$, periods had a significant impact on children's false belief performance when considered individually. Specifically, only 36.2% of children who experienced maltreatment during toddlerhood passed the false belief criterion as compared to 58.5% of youngsters who did not experience maltreatment during the toddler period. In addition, only 37.1% of children who experienced maltreatment during the preschool period passed the false belief all-pass criterion as compared to 59.9% of youngsters who did not experience maltreatment during the preschool years. Maltreatment during infancy and early school-age years did not significantly predict children's false belief understanding, χ^2 (1) = 3.53, *ns*; χ^2 (1) = .06, *ns*, respectively.

To determine whether the effects of maltreatment during the toddler and preschool periods on false belief understanding remained once the impact of CA and SES were considered, a hierarchical logistic regression was performed on the VMA restricted sample. CA and SES were initially entered in Step 1 of the analysis to predict the false belief all-pass criterion. Then the two developmental timing variables were hierarchically entered in subsequent steps, beginning with the presence/absence of maltreatment in toddlerhood at Step 2 and preschool period at Step 3. The results of this analysis are presented in Table 4. CA and SES each contributed significantly to false belief performance. Among the developmental timing variables, the presence of maltreatment during toddlerhood ($B = -.66$, $p < .05$) was found to uniquely predict passing the false belief criterion. Presence of maltreatment during the preschool period did not contribute independently to prediction. Therefore, the occurrence of maltreatment during the toddler period accounted for significant variance in false belief performance above and beyond the influences of CA and SES for those children with a VMA of 49 months or greater.

Onset of maltreatment. Next, we sought to determine the effect of the developmental period in which maltreatment first occurred (i.e., age period of onset) on false belief understanding. In these analyses, the VMA restricted sample size of 359 was reduced to 353 with the deletion of the few maltreatment cases with a school-age onset ($n = 6$). A 5×2 chi-square analysis was performed to assess the extent to which children with an infancy, toddlerhood, or preschool onset of maltreatment and youngsters in the two nonmaltreated groups (low- and middle-SES) differed in their false belief all-pass criterion performance (pass/fail). The overall chi-square value was significant, χ^2 (4) = 26.77, $p < .001$. Then, a series of 2×2 planned comparison chi squares was performed to examine the overall age period of onset effect in more detail, and a Bonferroni-based correction was applied. Planned comparisons among the three maltreatment onset groups and between each maltreatment onset group and the low-SES nonmaltreated group were performed. As such, the p values for each planned comparison chi square that was conducted (six total) needed to exceed .008 to be considered significant. The findings indicated that children whose maltreatment experiences began in toddlerhood had significantly lower false belief criterion passing percentages than maltreated youngsters with an infancy onset, χ^2 (1) = 7.54, $p = .006$, and low-SES nonmaltreated children, χ^2 (1) = 13.26, $p < .001$ (see left half of Figure 1). No other planned comparisons were significant.

To determine whether the effect of toddlerhood onset maltreatment on false belief understanding remained once CA and SES had been taken into account, a hierarchical logistic regression was performed. A dichotomized toddlerhood onset maltreatment variable was created (toddlerhood onset versus others). Maltreated children with a toddlerhood onset were coded as 1 and all other children (infancy onset, preschool onset, low-SES nonmaltreated, and middle-SES nonmaltreated children) were coded as 0. CA and SES were entered simul-

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Table 4. *Effects of the presence of maltreatment during toddlerhood and preschool period on false belief performance controlling for chronological age (CA) and socioeconomic status (SES) for children with at least a verbal mental age of 49 months*

	False Belief All-Pass Criterion			
	χ^2	*B*	Wald's *F*	*p* <
Step 1 (*df* = 2)	66.92***			
CA		.06	47.39	.001
Socioeconomic Status (SES)		1.20	17.59	.001
Step 2 (*df* = 1)	4.30			
Toddlerhood		−.66	4.29	.05
Step 3 (*df* = 1)	2.06			
Preschool period		−.58	2.08	.15

*$p < .05$. ***$p < .001$.

taneously into the regression equation at Step 1 of the analysis, followed by the dichotomized toddlerhood onset maltreatment variable at Step 2. Results revealed that after controlling for the effects of CA and SES, the toddlerhood onset maltreatment variable retained a significant regression coefficient ($B = -1.38$, $p < .01$) in predicting children's false belief understanding (Table 5). Thus, maltreatment that first occurs in the toddler period contributes significantly to the prediction of children's false belief performance above and beyond the influences of CA and SES for those youngsters with a VMA of 49 months or greater.

Chronicity of maltreatment. Maltreatment occurring across developmental periods (i.e., maltreatment chronicity) and its effect on false belief performance were also examined. A 4 × 2 chi-square analysis was performed to determine whether children who had experienced nonchronic versus chronic maltreatment and children in the two nonmaltreated groups (low- and middle-SES) differed in their false belief performance (pass/fail). The overall chi-square value was significant, χ^2 (3) = 17.72, $p < .01$. Then, a series of 2 × 2 planned comparison chi squares was performed to examine the maltreatment chronicity effect in more detail and a Bonferroni based correction was again applied. Three planned comparisons were conducted (nonchronic vs. chronic maltreatment group, nonchronic maltreatment vs. low-SES nonmaltreated group, chronic maltreatment vs. low-SES nonmaltreated group); therefore, the *p* values needed to exceed .02 to be considered significant. The results revealed that children who experienced chronic maltreatment had significantly lower false belief criterion passing percentages than low-SES nonmaltreated children, χ^2 (1) = 5.52, $p < .02$ (Figure 1). The other two planned comparisons were not significant.

A hierarchical logistic regression was then conducted on the VMA restricted sample to assess whether chronic maltreatment continued to predict false belief performance once the effects of CA and SES were considered. A dichotomized chronic maltreatment variable (chronic maltreatment versus others) was created utilizing the same coding procedure previously described. At Step 1, CA and SES were entered simultaneously into the regression equation, followed by the dichotomized chronic maltreatment variable at Step 2. Findings indicated that after controlling for the effects of CA and SES, chronic maltreatment failed to retain a significant regression coefficient ($B = -.44$, $p = .16$) in predicting false belief performance (Table 5). Therefore, chronic maltreatment alone does not account for significant variance in children's false belief performance above and beyond the impact of CA and SES for those children with at least a 49-month VMA. Given that the effect of maltreatment (including both chronic and nonchronic cases) was related to false belief

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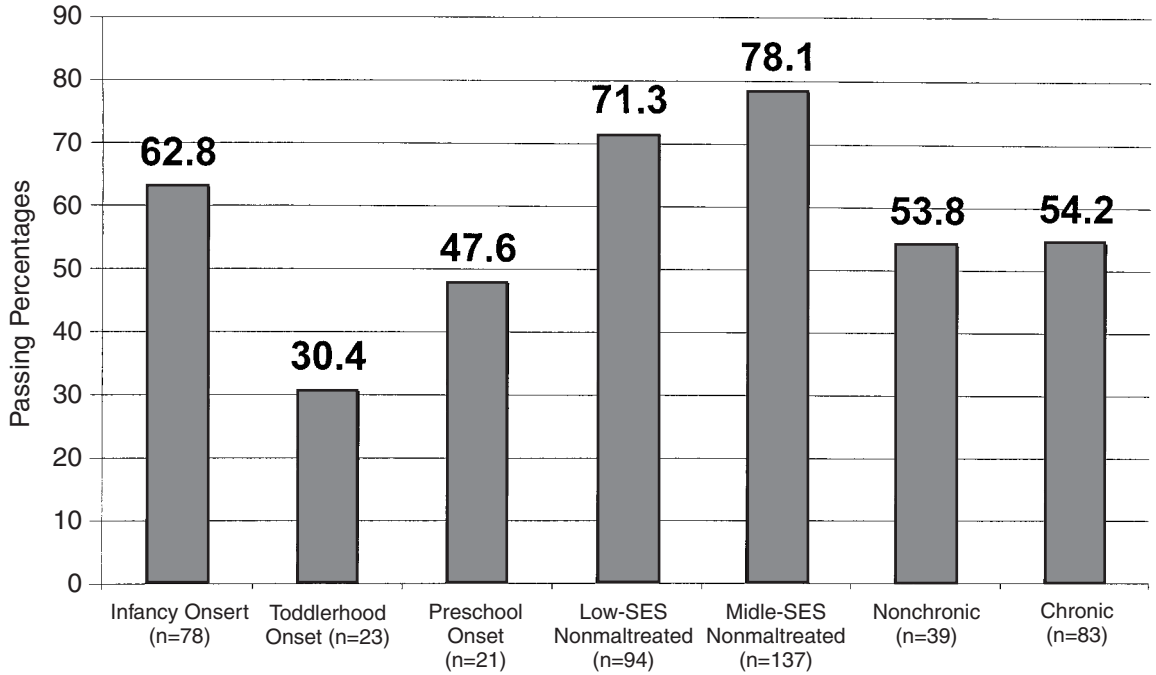


Figure 1. The false belief all-pass criterion passing percentages for children in the maltreatment onset and maltreatment chronicity groups.

Table 5. *Effects of toddlerhood onset maltreatment and chronic maltreatment on false belief performance controlling for chronological age (CA) and socioeconomic status (SES) for those children with a verbal mental age of 49 months or greater*

	False Belief All-Pass Criterion			
	χ^2	*B*	Wald's *F*	*p* <
Step 1 (*df* = 2)	64.90***			
CA		.06	45.05	.001
SES		1.21	18.07	.001
(a) Step 2 (*df* = 1)	7.77**			
Toddlerhood onset		−1.39	7.18	.01
(b) Step 2 (*df* = 1)	2.02			
Chronic maltreatment		−.44	2.02	.16

**$p < .01$. ***$p < .001$.

performance in previous analyses, chronic maltreatment alone does not appear to explain this relation.

Maltreatment subtype effects

The impact of maltreatment subtypes on children's false belief performance was the final maltreatment dimension assessed. First, a series of 2 (presence/absence of maltreatment subtype) × 2 (pass/fail false belief all-pass criterion) chi squares was conducted on the VMA restricted sample to determine whether the presence of each maltreatment subtype influenced false belief understanding in children. To control for experiment wise error, a Bonferroni based correction was applied. Only *p* values that exceeded .01 were considered significant. The findings revealed that both physical abuse and emotional maltreatment had significant effects on false belief performance when considered individually, χ^2 (1) = 13.23, $p < .001$; χ^2 (1) = 11.04, $p < .01$, respectively. Only 45.8% of children with a history of physical abuse passed the false belief criterion as compared to 72.0% of youngsters without a physical abuse history. Moreover, only 54.4% of children who were emotionally maltreated successfully demonstrated false belief understanding as compared to 73.2% of youngsters without a history of emotional maltreatment. The percentages of children with and without a history of sexual abuse and neglect who passed the false belief all-pass criterion did not significantly differ from children without those subtypes, 56.3 versus 69.1%, χ^2 (1) = 1.17, *ns*; 59.2 versus 72.0%, χ^2 (1) = 5.45, *ns*, respectively.

Next, we sought to determine whether the effects of physical abuse and emotional maltreatment on false belief understanding remained once the influences of CA and SES were controlled for. A hierarchical logistic regression was performed and results of this analysis are presented in Table 6. Physical abuse emerged as a significant unique predictor of children's false belief performance ($B = -.88$, $p < .05$), after controlling for the effects of CA and SES among children with at least a VMA of 49 months.

Discussion

Investigations of the determinants of human behavior are greatly hampered by the ethical impossibility of conducting experiments that will compromise the integrity of biological and psychological developmental processes. Hence, a valuable strategy that may be employed to circumvent this difficulty is to draw on the potential afforded by examining experiments of nature. Accordingly, in this investigation, child maltreatment, which exemplifies a pathogenic relational environment that poses

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Table 6. *Effects of physical abuse and emotional maltreatment on false belief performance controlling for chronological age (CA) and socioeconomic status (SES) for children with at least a verbal mental age of 49 months*

	False Belief All-Pass Criterion			
	χ^2	*B*	Wald's *F*	*p* <
Step 1 (*df* = 2)	66.92***			
CA		.06	47.39	.001
SES		1.20	17.59	.001
Step 2 (*df* = 2)	7.63*			
Physical abuse		−.88	5.16	.05
Emotional maltreatment		−.20	.35	.55

*$p < .05$. ***$p < .001$.

substantial risk for disturbances in development across a broad spectrum of domains of adaptation (Cicchetti & Lynch, 1995), served as a way of ascertaining the impact that maladaptive caregiving experiences have on the development of false belief understanding, a hallmark of a representational theory of mind. Reciprocally, we sought to discover whether the investigation of false belief understanding in maltreated children would affirm, challenge, or augment the extant theories of the development of theory of mind in normal and high-risk youngsters.

As predicted, CA and VMA were related to theory of mind development. Consistent with previous research (Jenkins & Astington, 1996), children with a VMA of 49 months or greater were much more likely to demonstrate false belief understanding. It is important that maltreated children with at least this level of linguistic ability were less likely to exhibit false belief understanding than both nonmaltreated children from lower SES backgrounds and nonmaltreated youngsters from middle-SES backgrounds. The effect of maltreatment in relating to theory of mind understanding remained significant after controlling for CA and SES.

The absence of any differences in false belief understanding between the lower and middle-SES groups of nonmaltreated children once a VMA of 49 months had been attained was not entirely surprising, despite being contrary to our hypotheses. The literature addressing the links between family sociodemographics and theory of mind development has been somewhat inconsistent. Consequently, it is not yet possible to render a definitive conclusion regarding the effects of low-SES on false belief understanding. Nonetheless, it is essential that future investigations of this association control for VMA and CA, as well as employ their own middle-SES comparison groups rather than relying on the normative data.

Findings from the investigation of false belief understanding in maltreated children suggest that child maltreatment influences the development of this aspect of theory of mind. The contribution that the very atypical rearing experiences that the maltreating environment makes to false belief understanding would most likely be less apparent in studying normative samples. Thus, the examination of the impact of child maltreatment provides insight into additional pathways whereby theory of mind deficits can eventuate.

In explaining the processes by which maltreatment experiences can affect the development of false belief understanding, two possible pathways seem plausible to us. First, we think that the pathways to false belief understanding in maltreated children and in children with deafness possess clear similarities. Specifically, the fact that signing children with deafness who have deaf parents and oral deaf children with hearing parents both develop false belief understanding, whereas signing deaf children who have hearing nonsigning parents exhibit deficits, suggests that

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parental input and communication, regardless of conversational modality, is more important to the development of theory of mind in deaf children than the presence of any neurodevelopmental abnormalities (Peterson & Siegal, 1999).

In a parallel fashion, maltreating caregiving may result in deficits in the development of theory of mind. Crucial parental communication that promotes theory of mind development may be restricted in maltreating families as a result of limited parental consistency, empathy, and sensitivity in addressing the child's internal experience. Furthermore, as discussed earlier, the development of IS language may be conceived as an early precursor of a theory of mind. Within a maltreating environment, children may learn from their parents that it is unacceptable, threatening, or even dangerous to discuss their feelings and emotions, particularly negative ones (Cicchetti & Beeghly, 1987). As such, the IS language deficits of maltreated children may reflect inhibited development in understanding the experience of self and other, thereby contributing to difficulty in acquiring theory of mind abilities.

Alternatively, it is conceivable that the difficulties that maltreated children have in expressing feelings in words may be not only a reflection of psychological intimidation but also a manifestation of neuroanatomical and neurophysiological changes in brain structure and function that occur secondary to abuse or neglect. Over the course of time in response to harsh and unpredictable parenting experiences, the neurobiological development of maltreated children may be altered, resulting in structural and functional anomalies (Cicchetti, 2002b; Cicchetti & Rogosch, 2001; DeBellis, 2001) that eventuate in the development of problems in false belief understanding. Children may be especially vulnerable to the effects of adverse experiences during periods of rapid creation or modification of neuronal connections, such as those that take place during neurobiological development in the early years of life (Cicchetti, 2002a; Edelman, 1987; Huttenlocher, 2002). Because experience-expectant and experience-dependent processes may continue to operate during adverse conditions such as child maltreatment, the developing brains of children who are subjected to pathological caregiving may acquire neuropathological connections instead of functional neural connections (Black, Jones, Nelson, & Greenough, 1998).

Features of maltreatment also were important in isolating aspects of caregiving experiences that were most strongly associated with theory of mind deficits. Maltreatment that occurred during the toddler period was uniquely related to problems in false belief understanding. In addition, onset of maltreatment during the toddler period also was related to an increased likelihood of deficits in false belief understanding. Furthermore, emotional maltreatment and physical abuse each were found to be more prevalent among maltreated children not demonstrating theory of mind understanding. However, after controlling for SES and CA, only physical abuse appeared to be uniquely related to problems with false belief understanding.

The centrality of the relation between maltreatment during the toddler period and theory of mind deficits flows from the importance of self development for false belief understanding. IS language; increased individuation and self-other differentiation; advances in language, conceptual development, and symbolic maturity; and the emergence of self-conscious emotions all occur during toddlerhood. As reviewed above, maltreated youngsters manifest difficulties in these aspects of self development, each of which is a precursor of theory of mind development (Cicchetti, 1991). Thus, the toddler period may be a particularly vulnerable time for experiencing the effects of maltreatment. In fact, we believe that toddlerhood may constitute a sensitive period for the development of false belief understanding deficits in maltreated children. Maltreatment occurring during this period may impair the development of crucial self- and neurobiological processes, thereby interfering with the normative attainment of theory of mind understanding, even when requisite language capacities have been acquired.

Physical abuse as a form of maltreatment appears to be particularly detrimental to the development of false belief understanding. It

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may be the harsh and unpredictable nature of the abuse and the uncertainty on the part of the child regarding expectations of parental behavior that interferes with theory of mind development. It is interesting that, although not all maltreated children appear to develop neurobiological anomalies associated with their adverse child-rearing experiences (Cicchetti & Rogosch, 2001), it is the physically and sexually abused children, as well as youngsters who have experienced three or more maltreatment subtypes, who are most likely to exhibit aberrations in brain structure and functioning (Cicchetti & Rogosch, 2001; DeBellis, 2001). The reasons for the absence of any relation between sexual abuse and problems in false belief understanding in the current investigation may be twofold. First, it may be a function of the small number of sexual abuse cases present. In future studies of false belief understanding, larger groups of sexually abused children should be included. Because sexual abuse is less common in the early years of life, it is especially challenging to recruit sufficient numbers of children with this form of maltreatment during the toddler years. Second, because self processes continue to undergo developmental reorganization over the life course, children with histories of sexual abuse occurring *after* toddlerhood may ultimately evidence alterations in more advanced theory of mind development, such as second order false belief tasks.

One limitation of this investigation is that we focused exclusively on the links between parental maltreatment and false belief understanding in children with a VMA of 49 months or greater, controlling for CA and SES. Future studies of maltreated children also need to incorporate neurobiological assessments in conjunction with assessments of parenting and false belief understanding. Possible neurobiological measures include structural and functional neuroimaging, as well as neuropsychological assessments of executive functions. The inclusion of such a perspective involving multiple levels of analysis should result in a more complete understanding of the mechanisms whereby maltreatment exerts its deleterious effects on theory of mind development.

Furthermore, longitudinal follow-up investigations that assess the predictive value of theory of mind into the school-age years will be needed in order to evaluate if theory of mind deficits contribute to future aberrations in the social arena. Specifically, children with theory of mind deficits might be expected to have difficulties with social interactions as exemplified by problems in the peer group and in the school context (Rogosch & Cicchetti, 1994; Shonk & Cicchetti, 2001).

In closing, we believe the current research enhances our knowledge regarding the effects of contextual influences on the acquisition of theory of mind. Although sociodemographic characteristics did not relate to false belief understanding, harsh parenting, particularly physical abuse, did adversely influence theory of mind abilities. Moreover, toddlerhood maltreatment emerged as a particularly salient developmental period for affecting theory of mind. The investigation of child maltreatment as an experiment of nature underscores the criticality of examining such atypical populations in order to further inform developmental theory.

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