



Toddlers' Responses to Infants' Negative Emotions

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Early developments in toddlers' responses to adults' distress have been extensively examined, but less work has been directed to young children's responses to other children in distress. In the current study, we examined 12-, 18-, and 24-month-old children's ($N = 71$) behavioral and affective responses to a crying infant (doll) present in the room with the child. A comparison condition included a contented, neutral infant to contrast with the crying infant so as to disambiguate social interest from distress-specific responding. Results showed that 12-month-olds were neither particularly interested in nor concerned about the infant, although they did discriminate between conditions. In contrast, 18- and 24-month-olds were socially interested and attentive to the infant, but 24-month-olds exhibited greater affective concern to the crying infant than did 18-month-olds. Children at all three ages were also mildly distressed themselves by the infant's crying, and this did not decline over the second year. Both girls and children without

siblings were more interested in the infant; no effects were found for gender, daycare experience, or siblings on affective concern.

Understanding and responding appropriately to others' emotional states is a crucial component of human social interaction and lies at the root of moral behavior. In children, it is linked to the broader domain of social competence (Eisenberg & Fabes, 1992, 1998; Eisenberg & Miller, 1987). In particular, mature prosocial responding derives from affective responses evoked by another person's emotions, combined with emotion understanding and perspective-taking skills, and motivated by the desire to alleviate pain or suffering in others (Batson, 1991; Bischof-Köhler, 1991; Eisenberg, 1997; Hoffman, 1975; Zahn-Waxler & Radke-Yarrow, 1990). More basic forms of affective experience may ground this system developmentally. For example, in infancy, another infant's emotional distress can produce a range of affective responses, even in the absence of understanding the other's emotional state or knowing how to intervene (Davidov, Zahn-Waxler, Roth-Hanania, & Knafo, 2013; Hoffman, 2000). However, affectively based prosocial responding ultimately requires a complex set of skills and knowledge: apprehending and understanding another's emotional state; managing one's own contagious or induced distress; utilizing learned strategies or inventing new ones for alleviating another's distress; and finally, wishing to do so.

In an influential theoretical proposal, Hoffman (1982, 2000) argued that infants are predisposed to respond empathically to others' facial and vocal expressions of distress. With development, their responses shift from self-oriented distress early in infancy to other-oriented empathic concern beginning in the second year of life, in concert with growing understanding of internal states and the ability to represent others' subjective states independently from their own (Moore, 2007), as well as advances in the ability to regulate emotions (Eisenberg, Fabes, & Spinrad, 2006). Several decades of empirical research have confirmed that toddlers respond to adults' distress with other-oriented affective concern and prosocial interventions (Knafo, Zahn-Waxler, Van Hulle, Robinson, & Rhee, 2008; van der Mark, van IJzendoorn, & Bakermans-Kranenburg, 2002; Robinson, Zahn-Waxler, & Emde, 2001; Young, Fox, & Zahn-Waxler, 1999; Zahn-Waxler & Radke-Yarrow, 1982; Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992; Zahn-Waxler, Robinson, & Emde, 1992), but considerably less work has been directed to the question of when and how young children begin to respond affectively and behaviorally to other children in distress. In the current study, we address this question with children in the second year of life, at 12, 18, and 24 months of age.

Research has established that during the second year children begin showing concern for and sometimes even comforting parents and other adults who exhibit pain or distress (Bandstra, Chambers, McGrath, & Moore, 2011; Volbrecht, Lemery-Chalfant, Aksan, Zahn-Waxler, & Goldsmith, 2007; Young et al., 1999; Zahn-Waxler & Radke-Yarrow, 1990; Zahn-Waxler, Radke-Yarrow et al., 1992; Zahn-Waxler, Robinson et al., 1992). Parents often actively scaffold, encourage, and reward children's comforting and helping behavior, and evidence suggests that a variety of direct and indirect parenting strategies serve to induce and maintain prosocial responding (Eisenberg et al., 2006; Hastings, Utendale, & Sullivan, 2007). However, when children encounter one another in distress, whether in sibling interactions or during peer play, adults are often not around to help them understand and negotiate the episode. When they interact with other children, toddlers must rely on their own immature understanding and skill, without the assistance of adults. Child-child interaction can thus provide a unique perspective on children's independent prosocial capabilities and motivations.

Responding to another child's emotions makes different demands on toddlers' nascent social understanding than responding to adults' emotions. The behavior and emotions of infants and toddlers are often unpredictable, and toddlers' emotional behavior is not always intelligible even to familiar, knowledgeable adults. Indeed, research suggests that 1-year-olds may be less skilled at interpreting other children's emotional communications than they are at understanding those of adults (Nichols, Svetlova, & Brownell, 2010). Toddlers' responses to peers' distress may therefore differ from their responses to adults in distress. Examining the development of young children's responses to an infant's emotions has the potential, therefore, to contribute an important piece to the puzzle of early developing social competence.

Naturalistic Studies of Toddlers' Responses to Peer Distress

Naturally occurring, unprompted prosocial responding to another child's distress in everyday settings is relatively rare in toddlers, even for children who interact with familiar peers and who have had substantial exposure to other children. For example, young toddlers between 9 and 27 months of age responded with concern or helping to only 11 out of 345 peer distress incidents in a daycare setting, or about 3% of the time (Lamb & Zakhireh, 1997). And, in fact, more than a third of the children in that sample became distressed themselves rather than responding prosocially. Older toddlers between 16 and 33 months of age responded to 22% of naturally occurring distress episodes (Howes & Farver, 1987). They

stopped playing or looked at the peer, and sometimes they tried to intervene; but only 6% of episodes involved an attempt to console or comfort the peer. Similar to the previous study, children who responded more often to peers' distress also cried more often themselves. When playing at home with a single familiar friend, toddlers' prosocial responses were somewhat more frequent: 12% of 18-month-olds, 29% of 24-month-olds, and 37% of 30-month-olds exhibited at least one instance of comforting, helping, or sharing in response to their playmate's distress, although up to 40% of children instead aggravated the friend's distress (Demetriou & Hay, 2004). Thus, in everyday contexts, toddlers respond relatively rarely but also quite variably to other children's distress, sometimes with attention, concern, or prosocial behavior, sometimes by further aggravating the peer, and sometimes by becoming distressed themselves. These studies suggest growth over the second year in children's sensitivity to peers' distress, understanding of peers' emotion expressions, and ability to respond prosocially.

Naturalistic observations have provided rich information about young children's responsiveness to other children's distress, but such studies cannot control for important factors that might influence children's affective or prosocial responsiveness. These include how the peer's distress was evoked (e.g., who or what caused it); the frequency, duration, and intensity of the distress; the child's own ongoing activity before and during peer distress; the behavior of nearby adults toward either the witnessing child or the distressed child; or the length and quality of the children's relationships with one another. As a result, our picture of the origins and developmental patterns of children's responses to other children in distress is incomplete, with a need for converging evidence from experimental approaches.

Experimental Studies of Toddlers' Responses to Peer Distress

Experimental paradigms, which can control many potentially confounding factors, have commonly been used to examine young children's affective responses toward adults in pain or distress; but they have not been widely employed to examine children's responsiveness to other children who are upset. However, a handful of experimental studies of infants' and toddlers' responses to peer distress have been recently reported. These have shown that infants as young as 6 months are aroused by video presentations of both positive (laughing, cooing) and negative (crying) infant emotion expressions, as indexed by pupillary responses (Geangu, Hauf, Bhardwaj, & Bentz, 2011), and more than three quarters of infants between 3 and 9 months of age exhibit contagious crying to an audio recording of

another infant crying, with no systematic decline with age (Geangu, Benga, Stahl, & Striano, 2010). It should be noted, however, that the intensity of crying in these studies was quite low at all ages, equivalent to mild protest that may or may not have been overt distress. Interestingly, the dominant facial expression while crying was anger rather than sadness, possibly because infants were constrained in an infant seat during the stimulus presentation, which may also have contributed to their negative affect. Finally, when infants between 8 and 16 months were shown a video of a crying infant on their home televisions under ordinary viewing conditions and while free to move about, they displayed on average “slight or fleeting” concerned affect such as a briefly furrowed brow, which did not increase with age (Roth-Hanania, Davidov, & Zahn-Waxler, 2011).

There are fewer experimental studies of toddlers’ responses to peers’ distress in the second and third years of life, and these have not examined how such responses change over the this period. Spinrad and Stifter (2006) compared 18-month-olds’ responsiveness to a parent’s, an experimenter’s, and a crying infant’s distress. The distressed infant, a realistic-looking swaddled doll, was held by the experimenter. Overall, 18-month-olds were more prosocial toward the crying baby (e.g., touching, hugging) than to the upset experimenter, although this was exhibited by fewer than 10% of children and only when the experimenter actually requested help with the baby. When 30-month-old children were exposed to an audio recording of a toddler crying outside the door of the laboratory playroom while they were playing (Gill & Calkins, 2003), they responded physiologically, with changes in heart rate and heart rate variability. Similar to infants, their facial and vocal affect were mild, with low levels of both interest and affective concern, possibly due in part to the fact that the “distressed toddler” was not in the room with them.

Together, these experimental findings show that infants in the first year of life are aroused by the sight and sound of distress in other infants and they respond with mild negative affect themselves. As argued by Hoffman (1982, 2000), this emotional response likely lays the foundation for the differentiation of more other-oriented responses to others’ distress in the second year of life, including prosocial behavior. However, we know much less from controlled experimental studies about how children respond to distress in other children in the second year than we do in the first.

In particular, little is known about the development of other-oriented responses to children’s distress over the second year—when other important aspects of prosocial responding and self-other understanding are also rapidly developing along with substantial growth in positive peer interaction (Brownell, Nichols, & Svetlova, 2013; Eckerman & Peterman, 2001; Hay & Cook, 2007). Importantly, it is also unknown how much toddlers’

responses to other children's distress differ from their reactions to other interesting or unusual behavior of their peers. That is, their responses to one another could be a function of prosocial motivations, or they could be due to more general social, affiliative motives, or even due to curiosity and general interest in other children. Consistent with the latter possibilities, Howes and Farver (1987) found that toddlers who were more interested in and engaged with peers in childcare were also more likely to respond to their peers' distress. As noted previously, infants at 6 and 12 months of age are aroused by both happy and distressed infant expressions. Do toddlers also behave similarly toward happy or content peers and distressed peers, or does distress evoke unique behavioral and affective responses by the second year of life? A primary aim of the current investigation was to examine the development of behavioral and affective responses over the second year to another infant's distress and to determine when responses to peers' distress begin to differentiate from social interest and general affective arousal to another's emotions.

Potential Influences on Early Responses to Other Children's Distress

A variety of child and environment factors might be expected to influence toddlers' responding to a distressed infant, including gender and experience with other children. There is some suggestion that toddler girls may show more affective concern than boys to adults (Knafo et al., 2008; Volbrecht et al., 2007; Zahn-Waxler, Radke-Yarrow et al., 1992; Zahn-Waxler, Robinson et al., 1992), with this effect becoming more pronounced with age (Zahn-Waxler et al., 1992). However, gender effects have been inconsistent when infants' responsiveness to other children is examined (Gill & Calkins, 2003; Roth-Hanania et al., 2011; Spinrad & Stifter, 2006). Because gender differences in early prosocial behavior have been less thoroughly examined than those in later childhood, relatively little is known about their origins, particularly toward other children (Eisenberg et al., 2006). In the current study, we therefore explored whether gender was associated with toddlers' responses to infant distress.

Experience with peers or siblings might also influence children's responsiveness to another child's distress. Play with other children may help toddlers better understand other children's emotion expressions or how to alter them, or may make them more motivated to alleviate other children's distress (Hay, Castle, Davies, Demtrious, & Stimson, 1999; Nichols et al., 2010). In naturally occurring sibling interactions, children as young as 18 months of age were observed to recognize distress in their older siblings and to sometimes try to allay it. Notably, however, they also sometimes tried to exacerbate it (Dunn & Munn, 1986). Similarly, in play with age

mates, children between 18 and 30 months of age who had older siblings were more likely to respond to the peer's distress by laughing or aggravating the other child than were those without older siblings (Demetriou & Hay, 2004). There is evidence that experience with siblings may promote more advanced understanding of others' internal states, which may contribute both to teasing behavior and also to prosocial responsiveness (Dunn, 1999). However, effects of children's prior experience with siblings and peers on their affective responses to other children's emotional distress remain relatively unexplored. Therefore, we examined whether having siblings or child-care experience was associated with toddlers' affective and behavioral responsiveness to an infant peer's emotions. We expected that experience with either siblings or peers would be associated with greater interest in another child's affect, but we had no specific expectations about the nature of children's responsiveness otherwise.

The Current Study

The current study aims to extend previous research on young children's affective and behavioral responses to others' distress by examining its development over the second year in response to an unfamiliar infant in a controlled experimental setting. Specifically, we examined 12-, 18-, and 24-month-old children's behavioral and affective responses to a crying infant. The infant, a realistic-looking baby doll, was in the room with the children to increase its salience and meaningfulness and to enhance ecological validity. The baby was not held or attended by an adult so that we could assess children's autonomous social and emotional responding, without adult scaffolding, coaching, or soliciting. We provided baby toys and comfort objects (bottle, blanket) within reach so that children had the relevant tools available to initiate a prosocial response if they were inclined to do so. Finally, to establish whether children's responsiveness was specific to the infant's distress or was due to more general social interest in another child, we included a comparison condition with a neutral and contented infant who cooed and gurgled. To capture the full range of children's responses to the infant, including attention and interest, and to distinguish behavioral, interest-based responding from emotion-based responding, we coded children's behavior toward the infant as well as their affective responses (concern; distress).

We expected that children at all three ages would manifest social interest in the happy infant. We further hypothesized that over the course of the second year responses to the distressed infant would progress from simple attention, to active interest, to affective concern and prosocial intervention because of advances in understanding, representing, and attribut-

ing other children's internal states such as emotion. Moreover, because prosociality may have roots in emotion contagion (Hoffman, 2000), we expected that personal distress in response to the infant would be greater early in the second year but would decline with the growth of prosocial responsiveness by 24 months. Finally, we anticipated that having siblings or child-care experience might relate to children's responses to the distressed infant. Because the evidence is mixed for gender effects in toddlers' empathic and prosocial responses and is somewhat limited in children this young, we had no specific expectations about gender effects. To our knowledge, this is the first study to examine experimentally both affective and behavioral responses of 1-year-old toddlers to infant distress; to do so at three points across the full span of the second year; to include a nondistress comparison condition; and to explore associations with past experience with other children. We thereby aim to shed new light on the origins and early development of children's affective responsiveness to other children and the emotional roots of prosocial responsiveness.

METHOD

Participants

Participants were 71 children (37 girls) divided into three age groups: 12 months ($N = 30$; 16 girls); 18 months ($N = 20$; 11 girls); and 24 months ($N = 21$; 10 girls). Children were tested within 3 weeks of their 12-, 18-, or 24-month birthdays. More children were tested in the 12-month group because it was expected that overt responses to an infant in distress would be rare in this group and we wanted to maximize our ability to detect them. Families were recruited from a medium-sized urban area and varied from working class to upper middle class by parent report; 74.6% were Caucasian, 7% African American, 14.1% other (including Hispanic, Asian, Indian), and 4.2% biracial. 52% of children had some playgroup or childcare experience (at least 1 h per week; $M = 13.2$ h per week), and 38% had at least one sibling, most of whom were older (only three children had younger siblings).

Procedure

The infant emotion task was administered as part of a larger study of early emotion understanding. It took place in a playroom with a one-way mirror across one end and was video recorded from behind the mirror. It began with a 10-min period of warm-up freeplay with the experimenter and a standard set of toys. While the child was engaged with the toys, the

experimenter brought an infant to the playroom (actually a doll, described below) secured in a standard, commercially available infant seat (Fisher-Price Baby Bouncer) on top of a high, rolling cart (96.5 cm high, 75 cm wide, 48 cm deep). She positioned the cart in the corner of the room approximately 6' away from the toys. The parent was seated approximately 6' away on the other side of the toys so that the child was approximately equidistant between parent and infant. While momentarily tending to the infant, the experimenter surreptitiously started an audiotape with prerecorded infant sounds (either distressed crying or contented cooing, described below) and then left the room. During the task, caregivers completed several questionnaires about their child's development, including the MacArthur Communicative Development Inventory short form, a well-validated and widely used measure of infant language development (CDI: Fenson et al., 2000) which was used to control for language in some analyses.

Parents had been instructed to let children play on their own and to focus on filling out questionnaires in order to appear occupied. They were also instructed not to comment on the infant or to initiate any conversation about the infant with their child, but to respond as they normally would if their child spoke to them or tried to get their attention, and then to return to the questionnaires rather than engaging the child. All parents complied with the instructions, and no parent spontaneously commented on the infant or suggested to the child what the infant was doing or feeling, or what the child should or could do. When children did request their parents' attention, parents responded with neutral responses ("Yes, the baby is crying") and no instances were identified of parental interference.

The task was modeled after the procedures used by Spinrad and Stifter (2006). A realistic-looking baby doll (51 cm long) was swaddled in a blanket, with its hair and the side of its face partially visible (see Figure 1). A small tape recorder was hidden inside the blanket near the head. The cart was high enough to prevent the children from touching or handling the doll and discovering that it was not real, and they could not see inside the swaddling. In Spinrad & Stifter's study, an adult held the baby doll; however, it seemed possible that the presence of an adult might dampen toddlers' responsiveness to the baby if they believed that the caregiver would be likely to tend to it; indeed, in Spinrad & Stifter, the adult had to ask the toddler to help before the child intervened. On the lower shelf of the cart within reach of the child were a baby bottle, a rattle, a receiving blanket, and a small stuffed animal. The experimenter announced "This is my baby" as she entered the room, rolled the cart into the corner of the room, and locked the cart's wheels to prevent it from being moved. She then turned on the tape recorder, walked to the door and announced, "I'll be



Figure 1 Infant (doll) on out-of-reach cart.

back in a few minutes.” The infant began vocalizing as the experimenter closed the playroom door behind her.

The audio sounds were downloaded from the internet. Exemplary infant sounds were chosen by the first author in consultation with the other authors. The crying audio was an infant’s distress cry, while the neutral audio was an infant cooing and gurgling. Each audio segment was approximately 30 sec long and was looped three times to create 90-sec recordings. The crying and neutral audios were equal in duration and approximately equal in volume as judged by the authors.

Each child was administered the task twice (crying infant; neutral infant), with order counterbalanced between children. Each episode lasted 90 sec. The procedures and materials were identical for each. After the first episode, the experimenter returned to the playroom, announced “the baby is tired, she/he needs a nap now” (labeled gender matched to child), and brought out new toys for the child as she removed the cart. Another

freeplay period ensued for approximately five minutes, after which the experimenter returned with the infant for the second time and announced "I've brought my baby back now," as she entered the playroom. When she returned at the end of the second episode, she again announced, "My baby is tired, she/he needs a better nap now" and allowed the children to say good-bye to the infant if they wished. The experimenter did not comment on the infant or its behavior. The freeplay toys remained available throughout the session and the parent remained in the room at all times.

Behavioral coding

We wished to obtain measures of both behavioral and affective responses. For example, attending to the crying infant could be simple interest, or it could be a marker of distress or concern. Thus, affective responses were coded separately from behavior. To capture the full range of children's behavioral responses to the infant, including attention, interest, approach, proximity, and verbalizations, the video records of children's behavior were event-coded using Noldus™ Observer 5.0 observation software. (Noldus Information Technology, Wageningen, The Netherlands.) Codes for specific task-related behaviors were adapted from previous research (Gill & Calkins, 2003; Sigman, Kasari, Kwon, & Yirmiya, 1992; Spinrad & Stifter, 2006) and from a review of the video records (see Table 1 for behaviors and definitions and Table 2 for descriptive statistics). Interobserver reliability was established between two raters who independently coded 19 children (27%), approximately equally distributed over age. Because individual behaviors were not mutually exclusive (e.g., talking about the infant and looking at the infant could be coded at the same time), percent agreement was calculated (see Table 1).

Three composite variables were created based on previous empirical findings on toddlers' responsiveness to adults' simulated distress as well as statistical and *a priori* conceptual considerations. First, dropping low frequency variables from analyses would mean losing some of the most conceptually interesting responses that children might have produced, such as offering the infant a toy or labeling the infant's emotion expression. We created composite variables in part to address this issue. Second, the composite variables were intended to represent gradually increasing levels of responsiveness to the infant from simple attention, to more active interest indicated by moving toward and remaining near the infant, to more pronounced expressions of clearly engaged social interest. To accommodate combining of both frequency and duration scores, all scores were z-transformed before being summed to create the composites. Frequencies and duration scores are presented in Table 2, prior to z-transformations.

TABLE 1
Dependent Measures and Interobserver Reliabilities

	<i>Definition</i>	<i>Interobserver reliability</i>
Behavioral composites		
Passive Attention	Duration of time child looked at the infant + duration of time stopped playing with the available toys	95.22
Active Interest	Total number of times that child approached the infant + duration of time spent in close proximity to the infant	86.24
Positive Social Expression	Total number of times child pointed + called attention + labeled the infant + labeled emotion expression + number of times handed toys to the infant	88.58
Affect ratings		
Affective Concern	Facial, vocal, gestural, and/or verbal signs of concern or sympathy for the infant that went beyond attentiveness or curiosity. This included sad or plaintive voice, facial expressions of concern such as furrowed brow or downturned mouth, or verbalizing "hurt," "sad," or "cry" along with vocal or facial concern.	Intraclass correlations 0.82
Personal Distress	Degree to which the child was visibly upset by the infant's distress, and included agitation, bodily tension or freezing, fear or wariness expressed vocally or facially, avoidance, crying or whimpering, self-comforting, or contacting the mother for comfort	0.80

The first composite variable, *Passive Attention*, consisted of the duration of time children looked at the infant and the duration of time that they stopped playing with the available toys. The second composite variable, *Active Interest*, consisted of the total number of times that children approached the infant (frequency) and the amount of time (duration) they spent in close proximity to the infant. The third composite variable, *Positive Social Expression*, consisted of the number of times (frequency) that children pointed to, verbally called attention to, or labeled the infant or its emotion, and the number of times they handed toys to the infant. While pointing and handing toys may be considered conceptually different, they jointly reflect a high level of social interest and expression and as

TABLE 2
Means and Standard Errors for Children's Behavior as a Function of Age and Condition
(Crying Infant; Neutral Infant)

	12 months Mean (SE)	18 months Mean (SE)	24 months Mean (SE)
Crying infant			
Behavior			
Look at infant ^a	.05 (.06)	.12 (.16)	.15 (.13)
Stop toy play ^a	.18 (.33)	.56 (.34)	.40 (.30)
Proximity to infant ^a	.16 (.29)	.18 (.26)	.36 (.39)
Approach infant	.30 (.79)	.95 (1.05)	.86 (.91)
Point to infant	.13 (.57)	1.75 (2.07)	1.14 (1.74)
Label infant	.03 (.18)	1.25 (3.18)	2.24 (2.83)
Label emotion expression	.00 (.00)	.15 (.67)	1.0 (1.52)
Hand toy to infant	.00 (.00)	.20 (.41)	.15 (.37)
Call attention to infant	.00 (.00)	.00 (.00)	.19 (.51)
Affect ratings			
Concern	.08 (.12)	.46 (.14)	.97 (.14)
Distress	.58 (.15)	.71 (.18)	.85 (.18)
Neutral infant			
Behavior			
Look at infant ^a	.03 (.04)	.07 (.08)	.09 (.08)
Stop toy play ^a	.04 (.14)	.40 (.28)	.34 (.30)
Proximity to infant ^a	.11 (.23)	.21 (.26)	.17 (.22)
Approach infant	.40 (.86)	.75 (.79)	.86 (1.06)
Point to infant	.03 (.18)	1.0 (1.92)	.19 (.51)
Label infant	.03 (.18)	1.60 (3.80)	1.29 (2.10)
Hand toy to infant	.00 (.00)	.10 (.31)	.33 (1.11)
Affect ratings			
Concern	.00 (.04)	.04 (.05)	.10 (.05)
Distress	.03 (.09)	.33 (.11)	.30 (.11)

Note. ^aProportions: duration of behavior per total observation duration.

individual behaviors they were too infrequent to analyze separately (see Table 2). Composite variables were created separately for the neutral and distressed infant conditions.

Affect ratings

To capture children's emotional responses to the infant in addition to their behavioral responses, an independent set of coders rated children's *Affective Concern* and *Personal Distress* over each 90-sec observation period. To avoid contamination, different raters coded concern and distress for a given child. Interobserver reliability was established between two raters who independently coded 15 children (21%), approximately equally

distributed over age. Coding criteria and intraclass correlations between raters are shown in Table 1.

Affective Concern and Personal Distress were separately rated on 4-point scales that incorporated frequency, duration, and intensity (0 = *none*; 1 = *infrequent, low intensity, brief*; 2 = *occasional or moderate in intensity or duration*; 3 = *frequent, intense, or prolonged*) adapted from Hastings, Zahn-Waxler, Robinson, Usher & Bridges (2000), and Young et al. (1999). Concern was reflected by facial, vocal, gestural, and/or verbal signs of concern or sympathy for the infant that went beyond simple attentiveness or curiosity. This included a sad or plaintive voice, facial expressions of concern such as furrowed brow or downturned mouth, or verbalizing “hurt,” “sad,” or “cry” along with vocal or facial concern. Personal Distress reflected the degree to which children were visibly upset themselves by the infant’s vocalizations, and included agitation, bodily tension or freezing, fear or wariness expressed vocally or facially, avoidance of the infant, crying or whimpering, self-comforting (e.g., thumb-sucking or hair pulling), or contacting the mother for comfort. Lower intensity, infrequent or brief or fleeting instances of these behaviors yielded lower ratings for these two codes, while multiple examples or one intense example of the behavior yielded higher ratings.

RESULTS

Five dependent measures were submitted to analysis (Passive Attention, Active Interest, Positive Social Expression, Affective Concern, and Personal Distress; see Figures 2 and 3). Preliminary analyses showed that there were no order effects on any measure. We first report analyses for age (12-, 18-, and 24 months), gender, and condition (neutral/crying infant). This is followed by analyses for the effect of experience with other children (siblings; daycare experience) on the same measures, controlling for age and condition.

Age, gender, and condition differences

We conducted a series of repeated measures analysis of covariance (ANCOVA) on each of the five dependent measures with task order as a covariate. Although there were no significant main effects for task order, we wanted to control for possible interaction effects; we did not test these directly as we had no *a priori* hypotheses about such interactions and because it would have halved cell sizes. Condition (crying infant; neutral infant) was the within-subjects factor, and age group (12 months; 18 months; 24 months) and gender (male; female) were between-subjects factors. Significant main

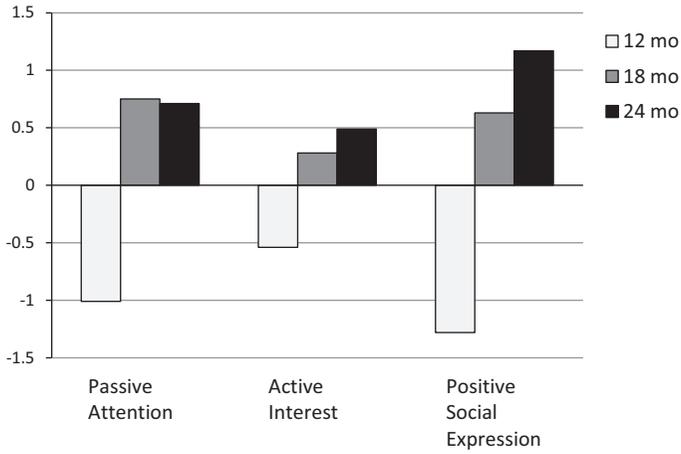


Figure 2 Children's behavioral responses toward the infant as a function of age (z-scores).

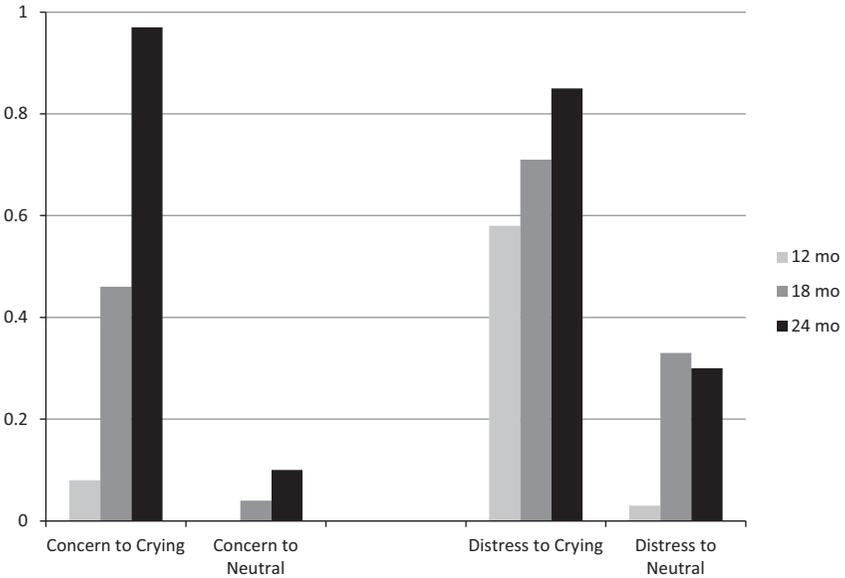


Figure 3 Children's affective concern and personal distress to crying infant and neutral infant, as a function of age.

effects were followed up with pairwise comparisons with Bonferroni correction; significant interactions were followed up with additional ANCOVAs and/or simple-effects *t*-tests as relevant. We conducted analyses separately on the five dependent measures rather than further compositing them because they represent different types of response to the infant and provide distinct but converging perspectives on young children's emerging capabilities. Results are reported for each dependent measure in turn.

Passive attention

A significant main effect emerged for age $F(2, 64) = 15.40, p < .0001$, with 12-month-olds showing less passive attention to the infant ($M = -1.01, SE = .24$) than 18-month-olds ($M = .75, SE = .29$) or 24-month-olds ($M = .71, SE = .28$), who did not differ from each other. This was qualified by a significant age \times gender \times condition interaction, $F(2, 64) = 3.27, p = .04$. Follow-up ANCOVAs were conducted separately at each age with gender and condition as the factors. At 12 months, there were no significant effects. At 18 months, a marginally significant interaction between gender and condition emerged, $F(1, 17) = 3.72, p = .07$, but follow-up *t*-tests did not yield significant condition differences for either males or females. At 24 months, the main effect for condition was significant, $F(1, 18) = 10.29, p = .005$, with both boys and girls responding with greater passive attention in the neutral infant condition than in the crying infant condition (see Table 2 for means). Thus, 18- and 24-month-old children were more likely to notice the infant than were 12-month-olds, and 24-month-olds were especially likely to stop playing to pay attention to the neutral infant.

Active interest

A significant main effect emerged for age, $F(2, 64) = 4.11, p = .02$, such that 12-month-olds showed less active interest in the infant ($M = -.54, SE = .25$) than did 18-month-olds ($M = .28, SE = .31$) who did not differ from 24-month-olds ($M = .49, SE = .30$). No other significant effects were found. Thus, 18- and 24-month-old children not only stopped playing to look at the vocalizing infant, but they also left their toys to approach the infant and they remained nearby and interested. This was true for both the neutral and the crying infant.

Positive social expression

Significant main effects emerged for age, $F(2, 64) = 14.86, p < .0001$, and gender, $F(1, 64) = 4.05, p < .05$. Twelve-month-olds exhibited less positive

social expression toward the infant ($M = -1.28$, $SE = .31$) than did 18-month-olds ($M = .63$, $SE = .38$) who did not differ significantly from 24-month-olds ($M = 1.17$, $SE = .37$). Across ages, boys exhibited less positive social expression toward the infant ($M = -.24$, $SE = .30$) than did girls ($M = .59$, $SE = .26$).

In addition, there was a significant age \times condition interaction $F(2, 64) = 6.82$, $p = .002$, as well as a significant age \times condition \times gender interaction $F(2, 64) = 6.93$, $p = .002$. Follow-up ANCOVAs were conducted separately at each age with gender and condition as the factors. At 12 months, there was a significant condition effect, $F(1, 27) = 82.29$, $p < .0001$, with less positive social expression toward the crying infant than toward the neutral infant (see Table 2 for means). At 18 months, a condition \times gender interaction emerged, $F(1, 17) = 5.57$, $p = .03$. Follow-up t -tests showed that 18-month-old boys did not respond differently in the neutral ($M = -.69$, $SE = .18$) and crying ($M = .69$, $SE = .90$) infant conditions, whereas 18-month-old girls were marginally more responsive, $t(10) = 1.89$, $p = .09$, to the neutral infant ($M = 2.11$, $SE = 1.05$) than to the crying infant ($M = .50$, $SE = .82$). At 24 months, a significant main effect for condition emerged, $F(1, 18) = 13.94$, $p = .002$, qualified by a significant condition \times gender interaction, $F(1, 18) = 5.28$, $p = .03$. Follow-up t -tests showed that 24-month-old boys, like 18-month-old boys, did not respond differently in the neutral ($M = .50$, $SE = .94$) and crying ($M = .85$, $SE = .79$) infant conditions, whereas 24-month-old girls were marginally more responsive, $t(9) = 2.13$, $p = .06$, to the crying infant ($M = 3.09$, $SE = 1.19$) than to the neutral infant ($M = .22$, $SE = .35$). In sum, 18- and 24-month-old children and girls exhibited more positive social expression toward the infant than did 12-month-olds and boys, pointing to the infant, vocalizing or verbalizing about it, or handing it a toy. Moreover, at 18 months, girls expressed more positive social interest in the neutral infant, whereas at 24 months, girls expressed more positive social interest in the crying infant.

Because this measure included both verbal and nonverbal responses, it is possible that the gender differences could have been due to more advanced language in the girls, consistent with findings from Rhee et al. (2013). To explore this possibility, we tested for gender differences in children's vocabulary scores from the CDI. There was no effect of gender on children's language ($F < 1$). We also conducted partial correlations between children's total vocabulary scores and positive social expression for the neutral infant and crying infant conditions separately, controlling for age; neither was significant (r 's = .10 and .01). Thus, the gender effect for positive social expressions toward an emotional infant cannot be

accounted for by language differences between boys and girls in this sample.

Affective concern

Significant main effects emerged for age $F(2, 64) = 11.64, p < .0001$ and condition $F(1, 64) = 12.10, p < .001$ on children's affective concern toward the infant (see Figure 3). 24-month-olds exhibited more affective concern overall ($M = .53, SE = .08$) than did 18-month-olds ($M = .25, SE = .08$) or 12-month-olds ($M = .04, SE = .07$), who did not differ from one another. Across age and gender, children exhibited less concern for the neutral infant ($M = .05, SE = .03$) than they did for the crying infant ($M = .50, SE = .08$). In addition, there was a significant age x condition interaction $F(2, 64) = 10.32, p < .0001$. Follow-up t-tests showed that 12-month-olds displayed low levels of concern for both the crying infant and the neutral infant (see Table 2 for means), which were not significantly different. Although 18-month-olds' overall level of concern did not differ from that of 12-month-olds, they did display significantly more concern for the crying infant than for the neutral infant, $t(19) = 2.63, p = .02$. 24-month-olds showed significantly more concern overall than did either 12- or 18-month-olds, and they also displayed significantly more concern to the crying infant than to the neutral infant, $t(20) = 4.69, p < .0001$.

Although 18-month-olds exhibited more concern for the crying infant than the neutral infant, they responded relatively infrequently and with low levels of concern overall. Fully 75% showed no concern whatsoever for the crying infant, and no 18-month old exhibited the highest level of concern. In contrast, 67% of 24-month-olds exhibited some amount of concern for the crying infant, and 10% received the highest rating. These age differences were significant, $\chi^2(5) = 12.21, p = .03$.

In sum, 24-month-old children exhibited greater concern for the crying infant than the neutral infant, and they did so more often and at higher levels than did 12- or 18-month-olds. Twelve-month-olds were relatively uninterested in the infant, even when it cried, and they exhibited virtually no concern, whereas 18-month-olds exhibited affective concern specifically toward the crying infant, but this was infrequent and low level.

Personal distress

A significant main effect emerged for condition $F(1, 64) = 15.89, p < .0001$ such that children showed more personal distress to the crying infant ($M = .71, SE = .10$) than to the neutral infant ($M = .22, SE = .06$). No other significant main effects or interactions emerged for personal dis-

tress. Thus, another infant's distress evoked mild distress at all three ages, but contrary to our hypothesis, distress to a crying infant did not decline with age even though affective concern increased with age.

Effects of siblings and childcare experience

To test for effects of previous experience with other children on toddlers' responses toward the infant's emotions, we conducted a repeated measures ANCOVA with condition (crying infant; neutral infant) as the within-subjects factor, and sibling status (siblings; no siblings) as the between-subjects factor on each of the five dependent measures, controlling for age and order. We conducted a separate set of ANCOVAs with childcare/playgroup status (no childcare; some childcare) as the between-subjects factor. Thirty-seven of the 71 participants had some current experience with other children outside the family ($M = 13.17$ h per week, $SD = 14.36$), while 33 had none; data were missing for one child.

There was a significant main effect for sibling status on passive attention to the infant, $F(1, 67) = 4.24$, $p < .05$, such that children without siblings ($N = 42$) showed more passive attention, stopping play to attend to both the crying and the neutral infant ($M = .25$, $SE = .20$) than did children with one or more siblings ($N = 26$; $M = -.41$, $SE = .25$). However, there were no significant effects of sibling status on active interest, positive social expression, affective concern or personal distress to either the crying or the neutral infant. Thus, contrary to our expectation, children with siblings were more likely to ignore the unfamiliar infant, regardless of its affect.

There were no significant main effects or interactions for childcare experience on any of the five dependent measures. To explore the possibility that a small amount of childcare or playgroup experience does not alter children's behavior but a more substantial period of exposure might have effects, we dichotomized the 66 children whose parents had provided detailed information about the hours of childcare into those who experienced 10 h per week or less ($N = 53$) and those who were in childcare for more than 10 h per week ($N = 13$). With this grouping as a between-subjects factor in another set of ANCOVAs, there were still no significant interactions or main effects for any of the dependent measures.

DISCUSSION

We found systematic age-related differences over the second year of life in toddlers' behavioral and affective responses to a crying and a neutral

infant peer. There were few effects for prior experience with peers or siblings. Using an experimental, laboratory paradigm, we controlled the quality and intensity of the infant's emotional vocalizations as well as the conditions under which the children encountered the infant. Results showed that 12-month-olds were not especially interested in either the neutral or the crying peer, nor were they concerned when the peer was distressed. Although it is possible that 1-year-olds might be more responsive to a distressed peer if they encountered the peer in active play, past naturalistic studies suggest otherwise as reviewed previously. Eighteen- and 24-month-olds, in contrast, were generally similar in their positive social interest and attentiveness to the infant, but 24-month-olds exhibited greater affective concern. More specifically, 18-month-olds were more socially interested in the neutral infant than the crying infant, pointing to it and vocalizing about it, whereas 24-month-olds were more interested in the crying infant. At both ages, the distressed, crying infant elicited greater affective concern than the neutral infant. However, affective concern was rare and low intensity at 18 months, with only 25% of children at that age exhibiting any concern at all. In contrast, by 24 months of age, two-thirds of children exhibited affective concern for the crying infant and 10% displayed high levels of concern. Children at all three ages were also mildly distressed themselves by the infant's crying, and this presumably contagious distress did not decline over the second year as we had expected. Thus, it appears that positive social interest in infants' emotions emerges between 12 and 18 months of age, which is then followed by the development of affective concern between 18 and 24 months of age.

The current study, unlike most previous experimental studies of toddlers' responses to others' distress, contrasted their responding to a distressed, crying infant with responses to a contented, cooing infant. Even 12-month-olds distinguished behaviorally between these two conditions, consistent with recent findings indicating differences in physiological arousal among 6- and 12-month-olds to other infants' happiness and distress (Geangu et al., 2011). For some behaviors, however, there were no differences in how toddlers responded to the two infant affect conditions, regardless of their age. Thus, including the neutral infant comparison condition reminds us that some of toddlers' reactions to infant crying may not necessarily be in response to the infant's negative affect specifically, but rather a display of interest and attention to a novel partner or interpersonal situation. Nevertheless, it is clear that over the second year toddlers do begin to direct their affective concern appropriately to another child who is communicating distress. Findings are discussed in greater detail below.

Age differences in responses to infant emotions

Twelve-month-olds displayed less overall attention and interest to both the neutral and crying infant than did their 18- and 24-month-old counterparts. They did not stop their play or look at either the neutral or the crying infant as often as the older children did, and they seldom approached the infant, unlike the older children. They also displayed very little positive interest by pointing to or labeling the infant or the infant's emotions, or by trying to engage it with a toy. Further, when 12-month-olds did call attention to the infant, it was significantly more likely to be to the neutral than the distressed infant. This suggests that their interest may have been social rather than prosocial in nature. Consistent with this speculation, 12-month-olds did not display affective concern toward the infant in distress. They did nevertheless notice and respond to the infant's distress with mild distress of their own, and this did not differ significantly from the older children. Thus, 12-month-olds in this study noticed an emotionally expressive infant peer, but exhibited weak social interest, and primarily when the other child was neutral. They experienced mild personal distress when the other infant was upset but did not yet display affective concern.

These data suggest that another infant's emotions may not be especially meaningful or motivating for young 1-year-olds, in contrast to the emotions of adults. By 12 months of age, infants seek out and use adults' emotions to help them interpret and decide how to respond to ambiguous events and situations (Campos & Stenberg, 1981; Feinman, 1982), but their responses to peers' emotion communications about ambiguous situations are quite different (Nichols et al., 2010). This difference between responses to peers and adults in 12-month-olds may be a result, in part, of the fact that adults imbue their interactions with infants with both positive and negative emotions from early in life (Cohn & Tronick, 1988; Rochat, Striano, & Blatt, 2002; Stern, 1985), thereby providing infants with rich and consistent emotional experiences in the context of events that are meaningful to infants themselves. Adults also help young children attend to and interpret emotions that they and others experience and express (Dunn, Brown, & Beardsall, 1991; Garner, Carlson-Jones, Gaddy, & Rennie, 1997). So, without the active participation and assistance of adults, 12-month-olds may not yet possess the necessary emotion understanding to interpret and respond appropriately to their peers' emotions. The fact that 12-month-olds displayed more personal distress to a distressed peer than a neutral one reflects their ability to discriminate between negative and neutral vocal emotion information and suggests that peers' negative emotions are differentially arousing for infants who are 12-months-old. Such distinct arousal patterns can undergird the development of emotion-

specific meaning with advances in understanding of peers' emotions, ultimately developing into the capacity and motivation to respond prosocially to a peer.

At 18 months of age, children displayed significantly more interest and attentiveness to both the neutral and the distressed infant, and they did not differ behaviorally from 24-month-olds in approaching and maintaining proximity to the infant, or in calling attention to or bringing toys or other items to the infant. However, for emotional responses to the infant, 18-month-olds performed more like 12-month-olds than like 24-month-olds. Although 18-month-olds did display greater concern for the crying than the neutral infant, in contrast to 12-month-olds who did not differentiate, affective concern for the crying infant was rare and fleeting at 18 months. Thus, while their behavioral expressions of interest in the infant's emotions differed significantly from their younger counterparts, when it came to affective concern, 18-month-olds were less responsive than 24-month-olds and more like 12-month-olds. Indeed, a number of the 2-year-olds exhibited the highest level of rated concern, whereas most 18-month-olds displayed no concern whatsoever. This suggests either that 18-month-olds do not yet understand their peers' emotions very well, or that infants' emotions do not yet arouse other-oriented affective responses. Both could be true. There is evidence that 18-month-olds do not use children's positive or negative emotions to govern their own behavior toward ambiguous objects, consistent with the former possibility (Nichols et al., 2010), and naturalistic studies have found relatively low rates of responding to peer distress among young toddlers, consistent with the latter (Caplan & Hay, 1989; Demetriou & Hay, 2004; Farver & Branstetter, 1994; Howes & Farver, 1987; Lamb & Zakhireh, 1997).

By the end of the second year, children are more socially attuned to the affective state of an infant when it is distressed than when it is neutral, although the current data suggest that this may be limited to girls at this age. Moreover, 2-year-olds seem to care about the affective state of an infant when it is distressed; that is, beyond simply being interested, they also become concerned about the infant. They not only call others' attention to the infant's distress, they also exhibit higher levels of facial, vocal, and verbal concern. As others have often noted, such concerned responding requires them to distinguish their own feelings of distress from the infant's and to attribute accurately the source of the distress to the other child's distinct and independent internal emotional states (Eisenberg & Fabes, 1998). Caring about another child's emotional distress further requires the ability to identify with the other, at least at some primitive level (Moore, 2007). Perhaps especially noteworthy, the children in this study received no communicative support, encouragement, or other scaffolding

from adults about whether or how to respond to the infant. Thus, we can be reasonably confident that we are witnessing the development of children's autonomous social competence and other-oriented affective responding over the second year. These findings are consistent with those from prior naturalistic and experimental research indicating that at 18 months children show low rates of affective concern to distressed peers (Lamb & Zakhireh, 1997; Spinrad & Stifter, 2006), but that such responses are more evident in subsequent months and years (Demetriou & Hay, 2004; Gill & Calkins, 2003).

Some researchers have recently argued that mature empathic concern in response to adults' or peers' distress is already in place by at least 8 months of age and that affective responses to others' distress do not develop further (e.g., Davidov et al., 2013). However, we would urge circumspection in drawing such conclusions at this point, especially given the still limited empirical evidence for the nature and level of infant responding to other infants' distress in the first year of life, and the limited conditions under which it has been elicited. In particular, it remains to be determined whether affective responses to other infants' distress in the first year represent qualitatively distinct precursors to later forms of responding that provide a foundation for subsequent developments, or whether they are indeed already-mature responses; it is also unknown whether early affective responding is selective to distress versus other emotions; finally, social interest has not yet been distinguished from other forms of behavioral and affective responding to other infants' distress in the first year of life. Results from the current study suggest that 12-month-old infants are more socially interested in a neutral than a crying infant, that their extremely low levels of concern do not differ for a neutral and a crying infant, and that their distress, while mild, may nevertheless exceed their concern. Over the second year, children evidence both greater interest in an infants' emotion communications, as well as increasingly distinct and appropriate emotional responding to distressed versus neutral infant emotions.

Other possible influences

Overall, girls were more positively interested in the infant, regardless of its emotion. More specifically, 18-month-old girls were more interested in the neutral than the crying infant, whereas the reverse was true for 24-month-old girls who were more interested in the crying infant. However, despite girls' more pronounced interest in the infant, there were no gender effects for affective concern. Thus, older girls are more compelled by an infant's

distress than younger girls, but they are not more concerned about the infant's distress than are their male counterparts.

Experience with other children, either with siblings or in childcare, might reasonably be expected to influence children's responsiveness to other children. However, this was not the case in the current study. Children without siblings were more likely to stop their play and look at the infant when the infant began to vocalize, regardless of the child's age or the valence of the vocalized affect. Perhaps, they found an infant more novel or they were more inclined to be attentive to a child close to their own age than those who had more experience at home with siblings. However, there were no other behavioral differences found for children with or without siblings or with or without daycare experience. Because the participants in the current study were quite young, very few had younger siblings that might have been similar in age to the infant, and relatively few had extensive daycare experience so these null effects should be interpreted with caution. Nevertheless, these findings mirror those of Demetriou and Hay (2004), who likewise found no daycare or overall sibling experience effects on children's responses to naturally occurring peer distress in this age period.

Limitations and conclusions

The findings from current study must be considered within the context of several limitations. The sample was modest in size, which can limit power to detect effects, and relatively homogeneous, which may constrain generalizability. It is possible that some participants were not fooled into thinking that the doll was a real infant, although it should be noted that this was not apparent in the children's responses. Likewise, the use of an elevated cart rather than a crib or lower placed infant seat might have confused some participants since it is not normative to place an infant seat on a rolling cart; however, the cart was necessary to be able to move the infant in and out of the room, the general appearance of the cart was similar to an infant changing table, and no infant seemed interested in or visibly puzzled by the cart. It is also possible that the use of an infant peer may have elicited greater interest or affective concern than would a same-age or older peer. On the other hand, it is possible that toddlers' responses were muted in the current study because the crying infant was unfamiliar to them. Studies of toddlers' concern for adults in pain or distress have found lower responses to unfamiliar adults than to mothers (Knafo et al., 2008; van der Mark et al., 2002; Robinson et al., 2001; Young et al., 1999). Likewise, the presence of their own caregivers in the room, even if caregivers were occupied, may have caused children to respond less; they may have been less likely to be interested or concerned themselves if their

mothers were not overtly interested in the infant, or they may have expected their own mothers to intervene. Responses might also have been muted because participants were exposed only to vocal information about emotions and not to the additional facial information that is usually employed in studies of responses to adults' negative emotions. More generally, this study assessed toddlers' responsiveness to infants in just one somewhat artificial setting in which they could not engage actively with the infant; their responses may have been more pronounced in a richer social context. Longitudinal, multimethod studies can address some of these limitations as well as explore how other social experiences, such as parental socialization or individual child characteristics might promote toddlers' responsiveness to the emotions of other infants and children.

In summary, the current findings shed light on toddlers' developing behavioral and affective responses to a younger peer's emotions. Social interest in an infant's affective vocalizations was clearly present by 18 months of age, but was quite limited at 12 months. Although 12-month-olds briefly interrupted their ongoing play to look up at an infant who was making contented, neutral, or crying sounds, both 18- and 24-month-olds approached, remained nearby, and pointed to or vocalized about the infant. By comparing children's responses to an infant's neutral versus negative emotions, it became evident that the latter half of the second year is an important transitional period with respect to understanding and responding to other children's affect. Even in this rigorous "test" of young children's responsiveness, that is, without benefit of adult input or guidance, there is strong evidence for early affective responses to an infant beyond simple social interest. Further, there are pronounced developmental changes over the second year in the nature of children's responsiveness to an infant's emotions, with their responses differentiating from simple attention to more active social interest to affective concern. Because responsiveness to others' emotions is at the root of prosocial and moral behavior, the findings also illuminate the early development of an important component of social competence. Parents and practitioners can use this information to help guide young children's responses to peers' emotions over the second year, including helping them understand what their peers' emotions mean and how best to respond to them, including with prosocial behavior (Williams, Mastergeorge, & Ontai, 2010).

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