TODDLER REGULATION OF DISTRESS TO FRUSTRATING EVENTS: TEMPERAMENTAL AND MATERNAL CORRELATES

By: Susan D. Calkins Mary C. Johnson

Calkins, S.D. & Johnson, M.C. (1998). Toddler regulation of distress to frustrating events: Temperamental and maternal correlates. *Infant Behavior and Development, 21*, 379-395.

Abstract:
Seventy-three mothers and their 18-month-old toddlers were observed in a series of laboratory procedures designed to assess relations among physiological arousal, frustration distress, emotion regulation and maternal interactive style. Physiological arousal was assessed using baseline measures of vagal tone and heart period. Distress was assessed across four separate episodes designed to elicit the intensity, frequency, duration and latency of the distress response to frustrating events. Regulation was assessed by examining the child,s behaviors (aggression, distraction, mother-orientation, constructive coping) when confronted by the four frustration tasks. Maternal interactive style was assessed by examining mothers, strategies for child behavior management (negative controlling, positive guidance, preemptive interference) during four mother-child tasks. Distress to the frustrating tasks was related to aggression/acting-out behaviors, and negatively related to the use of more adaptive strategies. Maternal interference was related to distress to the frustrating events, while maternal positive guidance was related to the use of distraction and mother-oriented regulating behaviors. These findings are discussed in terms of the adaptive value of emotion regulation in early development.
Key Words: emotion regulation temperament mother-child interaction toddler frustration

Article:
INTRODUCTION
Recent approaches to the study of individual differences in personality during infancy and early childhood have conceptualized these differences in terms of variability in temperamental reactivity and emotion regulation (Gunnar, Porter, Wolf, Rigatuso, & Larson, 1995; Rothbart & Derryberry, 1981). Variations among children can be observed in the latency, intensity, frequency, and duration of emotional reactions and in the attentional and behavioral strategies used to manage such reactions (Rothbart & Derryberry, 1981). Moreover, inherent in such approaches to temperament is the notion that the behavioral manifestations of emotion experience and emotion management have underlying physiological substrates (Calkins, Fox, & Marshall, 1996; Fox, 1989; Stifter & Fox, 1990). A number of recent studies have examined emotionality in infancy and have demonstrated that there are significant relations between temperamental reactivity and emotion regulation (Stifter & Braungart, 1995) and that these relations are reflected in physiological reactivity and regulation (Bazhenova, 1995; Calkins, 1997; Eisenberg et al., 1995; Gunnar et al., 1995).

One area of research that has focused on the relations among temperamental reactivity, emotion regulation and physiology is the study of negative emotionality. Often these studies focus on undifferentiated negative affectivity during early infancy. However, there is evidence that at least two stable behavioral patterns of negative affectivity are observable in infancy. One such pattern may be characterized by anger, low tolerance for frustration and high heart rate variability (Braungart-Rieker & Stifter, 1996; Stifter & Fox, 1990), while a second pattern is marked by withdrawal, fear, low heart rate variability and right frontal EEG asymmetry (Calkins & Fox, 1992; Calkins et al., 1996; Fox, 1989; Kagan, Reznick, & Snidman, 1987). These two types of negative behavior may differ in origin and may lead to very different behavioral outcomes later in development (Fox & Calkins, 1993). The outcome for fearful infants is likely to be in the direction of shyness and internalizing problems (Calkins, Fox, Rubin, & Coplan, 1995; Kagan, Reznick, & Snidman, 1988). In contrast, recent data on anger reactions in older children demonstrates that there may be relations to later externalizing-type behavior problems (acting-out, aggression, impulsivity) and difficulty in peer interactions (Eisenberg et al., 1995).

While there has been considerable research investigating the origins, implications and underlying physiology of types of negative reactivity, there has been less research on the regulation of negative reactivity. In one recent study, Stifter and Braungart (1995) examined changes in the types of regulatory behaviors infants use to manage emotional reactivity and observed that there were relations between these behaviors and changes in negative affect. Grolnick and colleagues (Grolnick, Bridges, & Connell, 1996) described the relations between emotion regulation strategies and distress among a sample of two-year-olds observed in a delay of gratification paradigm and a separation situation. Eisenberg and colleagues (Eisenberg et al., 1993, 1994, 1995) found relations among emotionality, emotion regulation and peer competence in early childhood. Finally, Rothbart and colleagues (Rothbart, Posner, & Boylan, 1990) observed that at least one specific emotion regulation behavior, that of attentional control, is related to decreases in negative emotionality in infancy. Taken together, these studies demonstrate that there are individual differences in the use of particular emotion regulation behaviors, that some behaviors are more effective than others for reducing negative affect, that the use of particular emotion regulation behaviors changes over time, and that certain behaviors affect the development of social competence. However, an important question yet to be addressed is how internal (temperamental or physiological) and external (caregiving) factors are related to individual differences in emotion regulation behaviors. To date, no study has examined the relations of both temperament and maternal behavior to regulatory behavior in toddler- hood, a critical period for the development of independence and the display of self-regulatory skills.

During infancy and early childhood, children gradually acquire the necessary emotion regulation skills and strategies that enable them to cope with a variety of developmental challenges (Cicchetti, Ganiban, & Barnett, 1991; Kopp, 1982, 1989; Tronick, 1989). In infancy, the child's success at emotion regulation depends heavily on the parent's sensitivity and responsivity to emotional expression and the child's need for intervention. During toddlerhood, the ability to use self-regulating behaviors becomes critical as the child is gaining independence, control, and an identity separate from the caregiver. Thus, the toddler period is a particularly important developmental phase for the study of emerging regulatory abilities and skills. Moreover, the role of parental management style, particularly with respect to the level of control of the child and discipline practices with the child, also becomes an important issue at this age. The goal of this

study was to explore individual differences in emotionality and their relation to factors both internal (temperamental and physiological) and external (maternal, in this case, although fathers and other caregivers make important contributions to developing regulation), and to examine the role such differences may play in the toddler's capacity to manage or regulate emotional responses.

The first issue we addressed in this study was the relation between characteristic physiological arousal and distress to a situation designed to be frustrating. The tendency to display distress was operationalized in terms of the latency, intensity, duration and frequency of the distress response (Rothbart & Derry- berry, 1981) observed across several frustration tasks. Physiological arousal was operationalized as autonomic activity, and was measured in terms of baseline patterns of heart rate and vagal tone. Following from the research of Fox and his colleagues with infants, demonstrating relations between negative reactivity in response to frustration and physiological arousal (Fox, 1989; Stifter & Fox, 1990), we hypothesized that the toddler's characteristic pattern of heart rate variability (baseline vagal tone) would be related to the level of distress displayed in the frustrating situations such that high vagal tone would be correlated with greater distress.

The second issue we addressed concerned the relation between distress to the frustrating tasks and the emotion regulating behaviors that the child displayed in the frustrating situations. Regulation of the distress response was operationalized in terms of five types of behaviors (self-comforting, distraction, aggression/venting, mother-orientation, constructive coping) that have been identified as ways young children typically respond in frustrating situations (Eisenberg et al., 1995; Stifter & Braungart, 1995). We hypothesized that children who displayed distress during the frustrating tasks would engage in more aggression and physical venting, and less distraction and constructive coping than children displaying little or no distress.

The third issue we addressed was the relation of maternal behavior to the child's emotional, and emotion regulating, responses to the frustration tasks. Gianino and Tronick (1988) described how the development of self-regulation occurs in the context of interactions between mother and child. They suggest that interactions characterized by mutual positive engagement teach the child to modulate emotional arousal. We hypothesized that the mothers' style of interacting with her child across a variety of contexts would be related to the child's tendency to use adaptive (constructive coping or distraction) versus nonadaptive (aggression or acting-out) regulatory behaviors. Importantly, distress and regulation of distress were examined in separate contexts from those that were used to explore maternal interactive style. Maternal behavior was defined in terms of both positive and negative behaviors that are displayed in typical mother-child interactions that may involve control and guidance of the child's behavior during toddlerhood. Parents who limit their use of negative or controlling behavior, but practice positive guidance techniques, might be more successful in helping children acquire skills such as distraction to assist them in managing distress (Pettit & Bates, 1989). Alternatively, a lack of such positive parental guidance may prove problematic for those children who are deficient in their own abilities to manage behavior, or who may be prone to experience emotional distress. Specifically, we predicted that positive guidance would be positively correlated with low distress and the use of distraction or constructive coping, that negative control would be related to low constructive coping and high aggression/ venting and that maternal interference would be related to the display of mother-oriented regulating behaviors.

The final goal of the study was to examine the complex relations among vagal tone, frustration distress, and maternal behavior as predictors of the child's ability to use particular adaptive (distraction, constructive coping) versus nonadaptive (aggression or venting) emotion regulating behaviors. We hypothesized that while baseline vagal tone would be a predictor of frustration distress, it would interact also with distress to influence maternal behavior: toddlers who were both physiologically reactive (high vagal tone) and emotionally reactive (distressed to frustration) might have mothers who were more interfering. Fabes et al. (1994) have demonstrated that mothers' perceptions of their children's emotional reactivity influenced their behaviors toward their children. We examined whether mothers' efforts to respond to their children's high level of physiological and emotional arousal would result in a pattern of preemptive behavior on the part of the mother. In addition, a final hypothesis we tested was that maternal interactive style would moderate the relation between distress and regulation. For example, children who displayed distress, but whose mothers engaged in more positive guidance would engage in less aggression and more constructive coping than distressed children whose mothers offered little positive guidance. Exploration of these more complex hypotheses would allow us to examine characteristic patterns of underlying physiology (vagal tone), emotionality (distress), and maternal interactive style (positive, negative, interfering) and their relation to one core component of social and personality functioning: emotion regulatory behavior during toddlerhood.

METHOD

Participants

Seventy-three 18-month-old toddlers (41 females, 32 males) and their mothers from a small southeastern city were the subjects in this study. Seven hundred recruitment letters were sent to a large number of families whose names were obtained from local birth records. Families who returned a brief questionnaire (90 families) were contacted by telephone and asked to come to the laboratory for an individual assessment within two weeks of the child's 18-month birthday. Approximately 80% of the families who returned the questionnaire agreed to come for the laboratory visit. Families were excluded if there were any prenatal or perinatal complications, or if gestational age was less than 38 weeks (pre-term). The families were primarily caucasian (7 African American, 1 Hispanic) and middle class (mean [Hollingshead, 1975] Four-Factor Index score 42.29, range 11 to 66, with the majority in the medium business/professional category or the skilled craftsmen/clerical category).

Procedures

Subjects were assessed in these procedures in the following order:

- *Collection of heart rate:* A research assistant placed three disposable pediatric electrodes in an inverted triangle pattern on the toddler's chest while the child was seated on the mother's lap. The electrodes were connected to a preamplifier, the output of which was run through a vagal tone monitor (VTM-I, Delta Biometrics, Inc, Bethesda, MD) for R-wave detection. The vagal tone monitor displayed ongoing heart rate and computed and displayed vagal tone every 30 seconds. A data file containing the interbeat intervals (IBIs) for the entire period of collection was transferred to a laptop computer for later artifact editing (resulting from child movement) and analysis. The child's resting heart rate was

recorded for 5 min while the child sat on the mother's lap and watched a segment of the children's musical video "Barney," which features a large purple dinosaur singing and playing with young children. All subjects viewed the identical 5 min portion of the program, which included a discussion of a new sibling and a song about families. Mothers were asked to keep their children seated and to limit interaction with them during data collection. The experimenter remained in the room for the collection of heart rate, but then limited her time in the lab playroom to entering and exiting with task items, except for the second barrier task (see below).

- *Freeplay:* The child was observed for 10 min while engaged in toy play with several age-appropriate toys. The experimenter asked the mother to sit nearby and respond to her child as she normally would, but not to direct play.
- *Compliance task with mother:* The experimenter asked the mother to ask her child if s/he would help her clean up the room by placing the toys in a toy box. Mothers were instructed to use whatever strategies they might use at home during the 5 min period.
- *Frustration task #1, plastic barrier task with mother:* The experimenter gave the mother a small wind-up toy to play with her child. After a minute of toy play, the mother took the toy and placed it in a clear plastic container for two min, during which time she did not interact with her child other than to ask the child to retrieve the toy. Mothers were asked not to retrieve the toy and to limit their involvement during the task, but if they
- were approached by the child for help, to encourage the child to open the container.
- *Structured toy play with mother:* The experimenter gave the mother a set of cups, plates and eating utensils and asked her to pretend to have a picnic with her child for a period of four min.
- *Frustration task #2, food denial:* The experimenter entered the room and placed some crackers sealed in a plastic bag on the sofa. The experimenter told the child that the crackers could not be eaten until after play was finished (an additional two min).
- *Teaching task with mother.* The experimenter gave the mother a shape sorter and instructed her to teach her child how to use it, for a period of four min.
- *Frustration task #3, high chair task:* The experimenter placed the child in a high chair and told the child to wait for a special toy for 5 min. The mother sat nearby with a magazine and was asked to respond normally to the child if the child spoke to her, but not remove the child from the chair.
- *Freeplay:* The child was observed for 4 min while engaged in toy play with several age-appropriate toys. The mother was asked to sit nearby and respond to her child as she normally would, but not to direct play.
- *Frustration Task #4, plexiglas barrier task:* While the experimenter and child sat at a table, the child was given a musical telephone with which to play. After 1 min of toy play, the experimenter took the toy away and placed it behind a plexiglas barrier, out of the child's reach, for two min. The mother sat nearby reading a magazine and the experimenter sat away from the child and the barrier.
- *Freeplay with mom:* The experimenter gave the mother a set of puzzles and a pounding-ball game and asked the mother to play with the child in any way she wished.

- *Maternal report of temperament:* At the end of the laboratory assessment, mothers were given the Toddler Behavior Assessment Questionnaire (Goldsmith, 1987) and asked to complete it within seven days and return it in a postage-paid return addressed envelope. Of particular interest was the summary score reflecting anger, as this was the scale which we hypothesized would reflect distress to frustrating events. Due to the low return rate of the questionnaire (61 of 73), the TBAQ was used to compare laboratory assessment of frustration distress to maternal report of anger, but was not included in any of the primary analyses.

Measures

Of particular interest from the 11 episodes were (1) autonomic activity, (2) distress to frustration, (3) regulatory behaviors during the frustration tasks and (4) maternal interactive style during the mother-child tasks. For the three groups of behavioral measures (frustration distress, regulation, and maternal behavior), the approach to the data reduction process involved creating standardized summary scores of measures that were conceptually related. This method of creating summary scores is common in studies of temperament where many behaviors are hypothesized to tap into the same dimension (Calkins & Fox, 1992; Coplan, Rubin, Fox, Calkins, & Stewart, 1994; Kagan et al., 1987; Stifter & Braungart, 1995) The creation of these summary scores is described below.

Two coders were involved in the scoring of the behavioral data. The coders trained to reliability by working together on 10% of the videotaped sessions, and independently scoring an additional 10% of the videotapes for the purpose of calculating reliability. Reliability is reported below for each set of behavioral measures.

Physiological Arousal— Heart Rate Measures

Using the software program MXEDlT (Delta Biometrics, Inc, Bethesda, MD), the 5- min data files were scanned for movement artifact, and then edited and analyzed in 30 sec epochs to derive the following measures: mean heart period, mean heart rate, vagal tone, and heart period variance. Two children from the sample refused to allow the experimenter to place the electrodes. Due to equipment malfunction, data was not collected on an additional four children. Extensive artifact editing was required on the data files from three children, and these data were eliminated from subsequent analyses. The mean number of 30 sec epochs for the entire sample (N = 64) was 9.5 (SD = 2.46) Data analyses will focus on measures of heart period and vagal tone. Mean heart period for the entire sample was 480.15 (SD = 37.00). Mean vagal tone for the entire sample was 4.05 (SD = 1.05). No sex differences were found for measures of either heart period or vagal tone.

Frustration Distress

Following from Rothbart (Rothbart & Derryberry, 1981) and Stifter and Fox (1990), measures of distress were operationalized as (l) the latency to cry (in sec), (2) the intensity of distress (scored every 10 sec on a scale of 0 to 5 with 0 indicating no distress and 5 indicating a full blown scream or cry), (3) the frequency of fussing (scored as the number of 10- sec intervals in which a fuss or fret was present) and (4) the duration of crying in sec. Descriptive statistics for these four measures for the four frustration tasks appear in Table 1.

Reliability for these four measures, across the four tasks was computed using Pearson correlations, and ranged from .87 to .95. Given the nature of the tasks, and the fact that the child was free to move about the room, no effort was made to score facial affect. The four frustration tasks are similar to those used by temperament researchers and others to elicit

TABLE 1
Descritpive statistics for distress and regulation measures for four frustration tasks

Frustration Tasks		*M*	*SD*	*Min*	*Max*
Container Barrier	Latency to cry	107.12	32.68	1	120.00
	Duration of cry	14.42	20.63	0	85.00
	Frequency of fuss	2.17	2.88	0	11.00
	Intensity of cry/fuss	.81	.93	0	4.00
	Constructive	4.65	2.92	0	11.00
	Aggression/act-out	.83	1.43	0	7.00
	Mother orient	1.28	2.06	0	11.00
	Distraction	2.23	3.52	0	15.00
	Self sooth	.33	1.01	0	5.00
Food Delay	Latency to cry	109.65	27.85	2	120.00
	Duration of cry	15.01	21.71	0	118.00
	Frequency of fuss	2.29	2.81	0	10.00
	Intensity of cry/fuss	.73	.95	0	4.00
	Constructive	3.24	3.05	0	10.00
	Aggression/act-out	.13	.50	0	3.00
	Mother orient	5.40	4.56	0	12.00
	Distraction	.69	1.81	0	9.00
	Self sooth	.03	.17	0	1.00
High Chair Restraint	Latency to cry	206.60	130.01	1	300.00
	Duration of cry	109.16	121.95	0	299.00
	Frequency of fuss	7.89	8.20	0	18.46
	Intensity of cry/fuss	1.92	1.74	0	5.00
	Constructive	3.39	3.66	0	17.00
	Aggression/act-out	.60	1.29	0	8.00
	Mother orient	.94	1.76	0	10.00
	Distraction	7.90	7.20	0	25.00
	Self sooth	3.12	4.38	0	15.00
Plexiglas Barrier	Latency to cry	107.83	33.95	1	120.00
	Duration of cry	6.23	17.27	0	119.00
	Frequency of fuss	.46	1.39	0	7.00
	Intensity of cry/fuss	.35	.62	0	3.00
	Constructive	1.03	2.39	0	12.00
	Aggression/act-out	.53	1.37	0	6.00
	Mother orient	.28	1.24	0	7.00
	Distraction	1.74	2.91	0	12.00
	Self sooth	.32	1.10	0	6.00

anger and frustration in infants and young children (Goldsmith & Rothbart, 1993; Matheny & Wilson, 1981). However, it is possible that emotions other than anger (sadness, fear) could be elicited during the tasks. The term "distress" was used to characterize the vocal affective responses of the children.

Comparisons of the four measures (latency, intensity. frequency, and duration of distress) across the four tasks using MANOVA ($F(3,192)$ was greater than 12.56, $p < .001$, for all four analyses) and post-hoc paired t-tests indi cated that the container barrier task and the food delay task elicited similar responses in terms of the four measures. The distress responses to these two tasks were significantly different from the high chair task ($p < .001$ for all measures) and the plexiglas barrier task ($p < .05$ for all measures). The measures of distress to the high chair task were

significantly different from the measures of distress to the plexiglas barrier ($p < .001$). While the tasks were all designed to elicit frustration in the children, the extent to which they stressed each child varied. Twenty children in the sample showed no distress to any of the tasks, while 12 children showed distress to three or four of the tasks.

To generate by-task indices of distress, summary scores reflecting the measures of reactivity (latency, duration, frequency, intensity) were computed for each frustration task. Within each of the four frustration tasks, these four measures were highly intercorrelated, rs ranged from .30 to .70. Given the high inter- correlations among individual measures, by- task summary scores were computed by standardizing and summing the reversed latency measure, the mean intensity measure, the duration of crying measure and the frequency of fussing measure. Thus, for each task, a single summary score of distress in response to frustration was computed. There were no sex differences with respect to any of these episode measures. Cross-episode correlations for these task summary measures were significant, rs ranged from .21 to .28, $p< .05$, for all but the food denial. And, correlations between these task scores and the maternal report of temperament using the anger dimension of the TBAQ indicated that the container barrier task and the high chair task were modestly positively corre lated with anger, $r = . 26$, $p = .06$ and $r = .30$, $p = .02$ respectively. The plexiglas barrier task was correlated .20, p = ns with maternal report of anger.

To generate a summary distress score across episodes, we examined the pattern of intercorrelations among the four distress measures across the four episodes. These correlations are presented in Table 2. As the table indicates, the measures from the food delay task were less likely to be correlated with other episode measures. Based on the task intercorrelations and the correlations with maternal report of anger, an overall frustration distress summary score was generated by standardizing and summing the four measures from the three intercorrelated task scores (container barrier task, high chair task, and plexiglas barrier task). Alpha reliability for this distress summary score was .56. This score, which was used in subsequent analyses had a M of —.14 and a SD of l.94 (range: —2.40 to 4.67). High, or positive, scores on the index indicated that the child was very reactive to the frustrating tasks (short latency to cry, high intensity cry, frequent fussing, long duration crying). Low scores on the dimension of distress indicated that the child was not reactive to the frustration

TABLE 2
Cross-task correlations for four distress measures for barrier, food delay and high chair tasks

	Food Delay	*High Chair*	*Plexiglas Barrier*
Container Barrier			
Latency to cry	.37**	.44***	.24*
Duration of cry	.05	.18+	.15
Frequency of fuss	.06	.26*	.17+
Intensity distress	.43***	.28*	.30**
Food Delay			
Latency to cry		−.11	.18+
Duration of cry		−.01	−.05
Frequency of fuss		−.03	.01
Intensity distress		.01	.05
High Chair			
Latency to cry			.31**
Duration of cry			.16+
Frequency of fuss			.26*
Intensity distress			.31**

tasks. A comparison of male and female subjects on this dimension of distress revealed no sex differences.

Regulatory Behaviors

Following from the work of others examining the regulatory behaviors of infants and young children (Braungart & Stifter, 1992; Eisenberg et al., 1993, 1994,1995; Stifter & Braungart, 1995), several behaviors reflective of regulatory efforts were scored during the four frustration tasks. These behaviors were scored for presence/absence in 10-sec intervals across five categories: (l) self-comfortingthumbsucking, hairtwirling, or other automanipulative behavior; (2) mother-orientationretreating to mom, asking mother for help, talking to or playing with mother, pulling on mom; (3) distraction—attending to or manipulating an object other than the box/barrier/high chair/food; (4) aggression/venting—banging, kicking, throwing, hitting the object of frustration (box, high chair, barrier); (5) constructive coping—efforts to open the box, bag, high chair, or retrieving the toy from behind the barrier. Kappas for these five categories of behavior ranged from .75 to .98. Descriptive statistics for these five measures for the four frustration tasks appear in Table l. There was a low frequency for the use of self-comforting behaviors, so this category of behaviors was eliminated from subsequent analyses.

There was cross-episode consistency in terms of the tendency to use some of these behaviors during some of the tasks. Given that the goal of the study was to examine relations to characteristic patterns of regulation, we computed summary scores across the frustration episodes. Those measures for which ps were greater than .10 were summed to generate cross-episode summary scores. Thus, the summary score for aggression/venting was generated from the high chair and container barrier task and plexiglas barrier tasks, rs ranged from .20 to .26, ps ranged from .08 to .03. The summary score for distraction was generated using the two barrier tasks, $r = .32, p < .01$. Mother- orientation was computed from the high chair and container barrier task, $r = .24$, $p < ,05$. Constructive coping was generated from the high chair and container barrier task, $r = .23$, $p < .05$. High or positive scores on each index indicated that the child was likely to use that particular behavior in the frustration episodes. Correlations among the four measures indicated that mother-orientation and distraction were significantly related, $r = .27$, $p < .03$. No sex differences were found on any of these regulation measures.

Maternal lnteraCtive Style

Three styles of maternal interaction were scored during the mother-child tasks (compliance, structured freeplay, teaching task, free- play). Maternal negative control was a summary score reflecting (l) frequency of negative verbal expressions (scolding, anger expressions, derogatory remarks directed to child, threats, no's); (2) frequency of physical control (restricting child's movement, pulling, pushing, picking child up, hand slapping); and (3) frequency of verbal control (directing the child's activity, telling the child what to do). Maternal positive guidance was a summary score reflecting (l) frequency of positive verbal expressions (praise, affection, laughter); (2) frequency of physical affection (Mom holds child's hand, hugs or kisses child, tickling, patting); and (3) frequency of verbal expressions of support/guidance (mother provides positive feedback, encouragement, makes suggestions). Maternal preemptive interference was a summary score of the frequency of mother actions that precluded the child from doing an activity themselves (placing the shapes in the shape sorter, putting toys in the toy box, banging the pounding game, making the puzzles). Scoring reliability for the behaviors comprising the three styles of behavior were computed using Pearson correlations and ranged from .69 to .88. Descriptive statistics for these measures for each of the four episodes appear in Table 3.

TABLE 3

Descriptive statistics for maternal interaction measures for four mother-child tasks

Mother-Child Tasks		*M*	*SD*	*Min*	*Max*
Compliance Task					
	Positive guidance	23.08	16.83	0	83
	Negative control	27.75	21.33	0	97
	Interference	4.05	3.34	0	13
Structured Play					
	Positive guidance	42.24	20.25	8	59
	Negative control	10.88	11.11	0	109
	Interference	6.08	3.86	0	14
Teaching Tasks					
	Positive guidance	26.88	17.68	1	89
	Negative control	26.32	20.19	2	78
	Interference	5.25	4.00	0	24
Freeplay					
	Positive guidance	20.68	18.21	0	78
	Negative control	19.00	18.79	0	93
	Interference	3.53	4.64	0	25

These three categories of behavior were stable across the four mother-child episodes, rs ranged from .39 to .60, ps ranging from < .05 to .001, and were thus standardized and summed across the four episodes. Summary scores for maternal negative control, positive guidance, and preemptive interference were used in subsequent analyses. High, or positive, scores on each maternal dimension indicated that the mother was likely to use that particular strategy when interacting with her child. Maternal preemptive behavior was not related to the other two maternal interactive styles. However, maternal positive guidance was negatively related to maternal negative control, r p = .01. No sex differences were found on any of these maternal measures.

RESULTS

Frustration Distress and Physiological Arousal

To examine the relations between baseline vagal tone and distress, we examined correlations between these measures. No significant correlations were found between heart period and vagal tone and the composite measure of distress. Separate analyses by sex also revealed no relations between these measures. Correlations between the heart rate measures and the task scores for container barrier, high chair, and plexiglas barrier revealed that there was a correlation between vagal tone and distress during the container barrier task, r = .29, p = .05.

Frustration Distress and Regulatory Behaviors

To explore the relations between distress and regulatory behavior, correlations between the four summary scores for regulatory style and the distress score were computed for the entire sample, and separately by sex. These composite sample correlations, as well as similar correlations within and across tasks, appear in Table 4. As the table indicates, all four composite measures of regulatory behavior were significantly correlated with the composite measure of distress. And, this pattern of results, with few exceptions, is consistent both within and across tasks. Toddlers who were displaying fussing, fretting and crying to the frustration elicitors were likely to kick, hit or throw the object of their frustration, and were unlikely to attend to their mothers, to distract themselves with other objects or to try instrumental or constructive behaviors to overcome the barriers. The findings were similar for boys and girls, except for the correlation between the composite measures of constructive coping and distress, r = —.47, p = .001 for girls versus r = .01, p = ns for boys. There was a trend toward a significant difference between these two correlations, z = 1.92, p = .06. For boys, distress was not related to a lack of constructive coping.

Maternal Interactive Style and Frustration Distress and Regulation

To examine the relations between maternal interactive style and distress, correlational analyses were conducted between the composite measure of distress and the three maternal interactive style measures. The distress score was significantly and positively related to maternal preemptive interference, r = .43, p = .001 and significantly and negatively related to maternal negative control, r = —.27, p = .04. These data demonstrate that toddlers who were likely to show distress to the frustration tasks had mothers who tended to do things for their children rather than allowing the children to do things for themselves. And, toddlers who were likely to show distress to frustration had mothers who were low on the dimension of negative control. There was no significant correlation between frustration distress and maternal positive guidance. Differing relations between distress and maternal behavior did not emerge as a function of gender.

To examine the relations between maternal interactive style and toddler regulatory behavior in response to frustration, correlations were conducted between these two groups of measures. These analyses indicated that maternal positive guidance was related to the child's

TABLE 4
Correlations between distress and regulation behaviors within and across frustration episodes

	Distress			
	Container Barrier	*High Chair*	*Plexiglas Barrier*	*Distress Composite*
Container Barrier				
Aggression	.25*	.16	.19+	.25*
Constructive	−.32*	−.21+	−.21+	−.26*
Distraction	−.22+	−.10	.04	−.22+
Mother	−.25*	−.17	−.37**	−.25*
High Chair				
Aggression	.26*	.28*	.32*	.38**
Constructive	−.10	−.18	−.11	−.18
Distraction	−.22*	−.60***	−.20+	−.56***
Mother	−.15	−.61***	−.20+	−.47***
Plexiglas Barrier				
Aggression	.13	.05	.39**	.26*
Constructive	−.14	−.20+	−.06	−.16
Distraction	−.37**	−.04	−.23*	−.32*
Mother	−.02	−.13	−.18	−.16
Composites				
Aggression	.35**	.38**	.48**	.45**
Constructive	−.26*	−.21+	−.22+	−.32**
Distraction	−.25*	−.39**	−.14	−.37**
Mother	-.14	−.50***	−.28*	−.45**

tendency to use distraction, r = .51, p = .001, and constructive coping, r = .37, p = . 03. Toddlers whose mothers tended to provide positive feedback and guidance tended to use object- oriented and constructive coping behaviors when confronted by frustration. Maternal negative control and maternal preemptive interference were not related to the use of any regulatory behaviors.

Vagal Reactivity and Frustration Distress as Predictors of Maternal Interactive Style

To examine the role physiology and distress as predictors of maternal behavior, we conducted a regression analysis using (1) vagal tone (centered, or standardized, prior to computing the interaction term, following Aiken & West (1991) who suggest that this eases interpretation and is more statistically conservative) (2) distress (centered) and (3) the interaction of vagal tone and distress as predictors of the three measures of maternal behavior. The analysis revealed that only one predictor, distress, was related to one type of maternal behavior, preemptive interference, b = .43, R2 = .19, F (l,57) = 4.39, p = .01. Neither the interaction of vagal reactivity and distress, nor vagal reactivity or distress alone, was a significant predictor of maternal negative controlling behavior or maternal positive guidance.

Frustration Distress and Maternal Behavior as Predictors of Emotion Regulation Behaviors

Separate regression analyses were conducted using (1) distress, (2) the three measures of maternal behavior (positive, negative, interfering), and (3) interactions between distress and maternal positive, negative, and interfering behavior, as predictors of the four types of regulating behaviors. These analyses will be reported separately for each type of regulatory behavior.

Aggression/Acting-out

The regression analysis to predict acting- out behaviors indicated that two predictors, distress and the interaction of maternal interference and distress, were significantly related to the use of aggressive/acting-out behaviors during the frustrating tasks, F (2, 66) = 11.68, p < .001, R2 =

.26. The b for distress was .53. t (59) = 4.59, p < .001, and for the interaction of distress and maternal interference the b was —.25, t (59) = —2.28, p < .05. To explore the nature of this interaction, we used procedures described in Aiken and West (1991). Specifically, three simple slopes were calculated to address the impact of distress on aggressive/ acting-out behaviors at three different levels of maternal interference (low, medium, and high). The results indicated that for all three levels of maternal interfering behavior, distress significantly predicted acting-out behaviors, blow = .40, t (64) = 3.36, p < .001; bmedium = .51, t(64) = 4.60, p < .001; bhigh = .60, t (64) = 4.71, p < .001. This pattern of results demonstrates an increasing display of aggression and acting out behaviors per unit change in distress, as the amount of maternal interference increases.

Distraction

The regression analysis to predict the use of distraction indicated that two predictors, distress and maternal positive guidance were significantly related to the use of distraction, F (2, 62) = 10.18, p < .01, R2 = .25. The b for distress was —.36, t (55) = —3.28, p = .001, and for maternal positive guidance b = .33, t (55) = 2.99, p = .005. No interaction terms were significant. Thus, distress and maternal behavior each exhibited a significant and independent effect on the use of distraction.

Mother-orientation

The regression analysis to predict maternal orienting behaviors indicated that only one predictor, distress, was significantly related to the use of these behaviors during the frustrating tasks, F(l, 67) = 16.18,p <.001, R2 = .19. The b for distress was –.44, t (60) = –4.02, p < .001. There was a trend for the maternal positive guidance to be related to mother-orientation, b = .21, t (60) = l.90, p = .06.

Constructive Coping

The regression analysis to predict constructing coping behaviors indicated that only one predictor, distress was significantly related to the use of these behaviors during the frustrating tasks, F(l, 66) = 7.16,p < .01; R2 = .09, b = –.31, t (59) = – 4.02, p < .01.

DISCUSSION

The aim of this study was to explore factors that may affect the use of particular emotion regulation behaviors in toddlerhood. We explored individual differences in emotion regulation in relation to characteristic patterns of physiological arousal, temperamental frustration distress, and maternal interactive style. The first issue that was addressed was whether there was a direct relation between frustration distress and physiological arousal as reflected in vagal tone. No direct relation emerged between the composite measure of distress and the measures of heart period and vagal tone. We did observe that high vagal tone was correlated with distress on the first frustration task—the container barrier task—but was not correlated with any other task. These data suggest that by 18-months-of-age there may not be a direct mapping of emotional and physiological reactivity that has been observed in the infancy period (although, as Gunnar et al., 1995 have pointed out, even the relations observed in infancy are often quite low). One reason that the relations may not be observed by toddlerhood may be that by the second year of life, autonomic measures such as vagal tone may be reflective of physiological regulation, rather than simply emotional reactivity or arousal (Eisenberg et al., 1995). Or, children may engage in

emotion regulating behaviors during the frustrating task that alter the display of distress, but nevertheless may remain physiologically aroused. In this case, the distress- arousal relation would not be observed.

The second issue we investigated concerned the relations between distress and regulatory behavior. We observed that the tendency to become distressed in the frustrating situations was related to the tendency to use aggressive-acting-out behaviors, both within particular tasks, and, to a lesser degree, during other tasks as well. It may be the case that some children react so negatively because they have not developed effective behaviors for coping when goals are blocked, movement is inhibited, or needs are denied. As a consequence, when confronted with such situations, these children may be overwhelmed by the frustration, become distressed, and lash out aggressively at the object of frustration. Eisenberg (Eisenberg et al., 1994) has argued that both high levels of emotional arousal and low emotional regulation play a role in the display of aggressive behavior. Another interpretation of this observed relation between distress and aggression is that acting-out physically is simply another manifestation of distress, one that reflects anger.

The tendency to be distressed was negatively related to the tendency to use more adaptive regulatory behaviors that reduce negative affect such as distraction, seeking out the mother, or constructive coping. It could be the case that the intensity of the response precludes some children from generating alternate behaviors for coping in this particular situation. A trend for a sex difference in the use of constructive coping suggests that perhaps parents may not encourage girls as much as they do boys to harness their distress toward a more constructive solution to their problems. It could be that girls' distress typically elicits parental intervention, while their male counterparts' distress may elicit more encouragement from parents to keep trying to obtain their goal or overcome a barrier. In addition, unlike the investigations of emotionality and emotion regulation conducted by Eisenberg and colleagues (Eisenberg et al., 1994, 1995), our measures of the two constructs are derived from the same task. Thus, it is difficult to know whether children who were distressed in our laboratory are incapable of using adaptive behaviors. And, it is difficult to know whether children who were not distressed were regulating well, or were simply not reactive to, or challenged by, the tasks.

The third specific goal of this investigation was to examine the relations between maternal interactive style and both frustration distress and the regulation of distress. In conducting these analyses, the assumption was that the experience of the child in interactions with the mother is related to both the child's tendency to become distressed when confronted by a frustrating situation and to the kinds of behaviors the child uses to manage that distress. The data indicate that maternal preemptive action (i.e. doing activities for the child, rather than allowing the child to do them for themselves) was related to the tendency of toddlers to display distress in response to a frustration task. One interpretation of this finding is that mothers may do things for their children in order to avoid negative outbursts which may be a characteristic of the child's personality. This explanation is consistent with Fabes et al.'s (1994) finding that parents' behavior reflects their perceptions of their child's emotionality. Alternatively, children may develop a low tolerance for frustration because their efforts to do things independently are continually being thwarted. Interestingly, while maternal preemptive interference was positively correlated with the tendency to display distress, maternal positive guidance was not negatively

related to this tendency. However, toddlers whose mothers tended to provide positive feedback and guidance tended to use distraction and constructive coping behaviors when confronted by frustration. So, mothers' positive behavior is not related to the child's tendency to become distressed, but is related to the emotion regulating behaviors the child displays when in a situation that may elicit distress. Finally, we observed a modest negative association between maternal negative control and distress such that the more negative and controlling the mother was, the less distressed the child was likely to be. This finding runs counter to our hypothesis that negative maternal behavior would be associated with negative child behavior. One explanation for this finding is that our measure of negative control included the frequency of controlling or directive statements, which may, in fact, serve the more adaptive function of teaching the child self- control. Crockenberg (Crockenberg & Littman, 1990) has scored these types of behaviors separately from other negative behaviors in the belief that they are different, and differentially related, to child behavior.

The final goal of the study was to examine the more complex relations and interactions among physiology, distress, maternal interactive style and emotion regulation. Several findings emerged. First, physiological reactivity, as measured by cardiac vagal tone, did not interact with emotional reactivity, as measured by distress, to predict maternal interactive style. Emotional reactivity seems to override any effect of underlying physiological reactivity on maternal behavior. What we are observing by the toddler period is that the mother is responding to her child's behavioral display of arousal, not the underlying physiological arousal or the history of distress that arousal may have produced. Second, distress and one type of maternal behavior (interference) interacted to predict the use of only one type of regulatory behavior: aggressive/acting out responses. For the most part, regulatory behaviors were more strongly related to the tendency to be distressed to the event, rather than to maternal behavior, or the interaction of maternal behavior and distress. However, maternal positive guidance was significantly and independently related to the use of distraction, and showed a trend toward a relation to the use of mother-oriented behaviors, once the variance associated with distress was accounted for.

These data demonstrate that there are individual differences in the tendency to display distress to frustration that are apparent in toddlerhood and that this tendency is related to both maternal behavior and the coping behaviors that the child uses in situations that may be frustrating. Moreover, it may be the case that there are multiple influences (temperamental and environmental) on the regulatory behaviors that children use in frustrating situations. For some children, there may be a dispositional influence that affects the likelihood that they will react with frustration and regulate with aggression, rather than distraction or constructive coping. In addition, the mother's style of interacting may influence the likelihood that a child who is distressed during a frustrating situation will distract herself with other objects or activities or will engage in efforts to overcome barriers independently. ln addition, mothers who use a lot of positive guidance may have been more likely to intervene with distraction or redirection during the frustration task itself, an activity that may have reduced the child's distress. And, there is some evidence that these two factors, temperament and caregiving, may interact in some cases, to impact on the use of particular strategies.

It is difficult to say how stable these individual differences we have identified at 18months-of-age will be, or what the direction of effects is among the temperament-caregiving regulation factors. Regardless of the direction of effects, or whether the behavior is the result of environmental factors or temperamental factors, it has been demonstrated that the ability to manage distress and anger when frustrated is likely to be critical for later adaptation. And, it is apparent that such skills begin to develop in infancy and become consolidated during toddlerhood so that by the child enters preschool, these skills may play an important role in the development of self-control (Kopp, 1982) and social competence (Rubin, Coplan, Fox, & Calkins, 1995). For example, Eisenberg, Fabes, and their colleagues (Eisenberg et al., 1993, 1994; Fabes & Eisenberg, 1992) found that individuals who are highly emotional in response to anger- inducing events and low in regulation skills are likely to display aggression. Eisenberg hypothesizes that the intensity of anger is related to a loss of behavioral control. Particular behaviors such as attentional control, avoidance, instrumental coping, may be useful in dealing with frustration (Eisenberg et al., 1993, 1994). Children who fail to use such behaviors tend to vent their emotions and may become aggressive. Moreover, Eisenberg' s data demonstrates that there are important implications of anger and the regulation of anger for peer relations. Highly emotional children who were low on regulatory skills were also low on social skills and sociometric status (Eisenberg et al., 1993, 1994). Thus, styles of emotion regulation that may be evident in infancy and toddlerhood come to play an important role in children's interactions with others (Rubin et al., 1995).

Clearly, there are a number of issues that need to be addressed to understand better the factors that affect the use of adaptive versus nonadaptive emotion regulation behaviors during toddlerhood. First, this study has a number of limitations that make the conclusions we have drawn somewhat tentative. For example, given the complex interactions that are possible, a larger number of subjects would increase the likelihood of detecting small but important effects. Second, it would be useful to investigate the particular affects (sadness, fear, anger) that may be displayed in the frustration response. We can only speculate that the distress we observed was frustration and we have no way of knowing how the child construed the task (frustrating versus not frustrating, solvable versus impossible). Third, the study is limited in that the data are generated in a single laboratory visit. Multiple assessments, multiple sources of information (parent report of coping, for example), and naturalistic observations of everyday frustration with no constraints on maternal behavior would clearly strengthen this study. Fourth, the tasks that were designed to elicit frustration and the regulation of distress differed to some degree in terms of the task demands, the available resources (mother versus experimenter present, for example), the extent to which the mother intervened and the degree to which the task was solvable, all of which may have contributed to modest cross-episode relations. Moreover, it may be problematic to expose a child to several distress elicitors during a relatively short period of time because it is difficult to evaluate whether there were cumulative effects and how such effects are related to a child's typical response to a single frustrating situation in a naturalistic context. A final issue that should be addressed further is the question of how temperament, physiological arousal and maternal behavior affect the development of self-initiated emotion regulation skills that emerge during the toddler period. To address the issue of how these behaviors are acquired, what affects their acquisition, and whether these skills impact psychosocial adaptation in important ways, future studies should be both multi-component and longitudinal. In this way, we could study the

developmental processes of acquiring emotion regulation skills and behaviors in the context of both behavioral and biological predisposition and early patterns of parent-child interaction.

Acknowledgment: This research was supported by a New Faculty Grant and a Summer Excellence Award from the University of North Carolina at Greensboro to Susan D. Calkins. The authors would like to acknowledge the assistance of Alice Mendelsohn- Moore for her help in data coding. The authors also thank the families who participated in the study. Portions of this paper were presented at the lnternational Conference on Infant Studies, April, 1996, Providence, R.I.

REFERENCES

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions.* Newbury Park, CA: Sage Publications.

Bazhenova, 0. (1995, April). *Vagal tone dynamics: A physiological parallel of the dynamics of affect.* Paper presented at the Biennial Meeting of the Society for Research in Child Development, Indianapolis, IN.

Braungart, J., & Stifter, C. A. (1991). Regulation of negative reactivity during the Strange Situation: Temperament and attachment in 12-month-old infants. *Infant Behavior and Development, 14,* 349-364.

Braungart-Rieker, J., & Stifter, C. (1996). Infants' responses to frustrating situations: Continuity and change in reactivity and regulation. *Child Development,* 67,1767-1769.

Calkins, S. D. (1997). Cardiac vagal tone indices of temperamental reactivity and behavioral regulation in young children. *Developmental Psychobiology, 31,* 125-135.

Calkins, S. D., & Fox, N. A. (1992). The relations among infant temperament, security of attachment, and behavioral inhibition at 24 months. *Child Development, 63,* 1456-1472.

Calkins, S. D., Fox, N. A., & Marshall, T. R. (1996). Behavioral and physiological antecedents of inhibition in infancy. *Child Development,* 67, 523-540.

Calkins, S. D., Fox, N. A., Rubin K. H., & Coplan, R. (1995, April). *Longitudinal outcomes of behavioral inhibition: lmplications for peer play behavior.* Paper presented at the Biennial Meeting of the Society for Research in Child Development, Indianapolis, IN.

Cicchetti, D., Ganiban, J., & Barnett, D. (1991). Contributions from the study of high-risk populations to understanding the development of emotion regulation. In J. Garber & K. A. Dodge (Eds.), *The development of emotion regulation and dysregulation* (pp. 69-88). Cambridge: Cambridge University Press.

Coplan, R. J., Rubin, K. H., Fox, N. A., Calkins, S. D., & Stewart, S. (1994). Being alone, playing alone and acting alone: Distinguishing among reticence and passive- and active-solitude in young children. *Child Development, 65,* 129137.

Crockenberg, S., & Litman, C. (1990). Autonomy as eompetenee in 2-year-olds: Maternal correlates of child defiance, compliance, and self- assertion. *Developmental Psychology,* 26,961— 971.

Eisenberg, N., Fabes, R., Bernzweig, J., Karbon, M., Poulin, R., & Hanish, L. (1993). The relations of emotionality and regulation to preschoolers' social skills and sociometric status. *Child Development, 64,* 1418-1438.

Eisenberg, N., Fabes, R., Murphy, B., Maszk, P., Smith, M., & Karbon, M. (1995). The role of emotionality and regulation in children's social functioning: A longitudinal study. *Child Development, 66,* 1360-1384.

Eisenberg, N., Fabes, R., Nyman, M., Bernzweig, J., & Pinuelas, A. (1994). The relations of emotionality and regulation to children's anger-related reactions. *Child Development, 65,* 109-128.

Fabes, R., & Eisenberg, N. (1992). Young children's coping with interpersonal anger. *Child Development, 63,* 116-128.

Fabes, R., Eisenberg, N., Karbon, M., Bernzweig, J., Speer, A., & Carlo, G. (1994). Socialization of children's vicarious emotional responding and prosocial behavior: Relations with mothers' perceptions of children's emotional reactivity. *Developmental Psychology, 30,* 44-55.

Fox, N. A. (1989). Psychophysiological correlates of emotional reactivity during the first year of life. *Developmental Psychology, 25,* 364-372.

Fox, N. A., & Calkins, S. D. (1993). Pathways to aggression and social withdrawal: Interactions among temperament, attachment and regulation. In K. Rubin & J. Asendorpf (Eds.), *Social withdrawal, shyness and inhibition in childhood* (pp.

83-100). Hillsdale, NJ: Lawrence Erlbaum .

Gianino, A., & Tronick, E. (1988). The mutual regulation model: The infant's self and interactive regulation and coping and defensive capacities. In T. Field, P. McCabe & N. Schneiderman (Eds.), *Stress and coping across development* (pp. 47-68). Hillsdale, NJ: Erlbaum.

Goldsmith, H. H. (1987). *The Toddler Behavior Assessment Questionnaire.* Unpublished manuscript, University of Oregon.

Goldsmith, H. H., & Rothbart, M. K. (1993). *The laboratory temperament assessment battery (LAB-TAB).* Unpublished manuscript, University of Wisconsin.

Grolnick, W., Bridges, L., & Connell, J. (1996). Emotion regulation in two-year-olds: Strategies and emotional expression in four contexts. *Child Development, 67,* 928-941.

Gunnar, M., Porter, F., Wolf, C., Rigatuso, J., & Larson, M. (1995). Neonatal stress reactivity: Predietions to later emotional temperament. *Child Development, 66,* 1-13.

Hollingshead, A. B. (1975). *Four-Factor Index of Social Status.* Unpublished manuscript, Yale University.

Kagan, J., Reznick, J.S., & Snidman, N. (1987). The physiology and psychology of behavioral inhibition in children. *Child Development, 58,* 14591473.

Kagan, J., Reznick, J. S., & Snidman, N. (1988). Biological bases of childhood shyness. *Science, 240,* 167-171.

Kopp, C. (1982). Antecedents of self-regulation: A developmental perspective. *Developmental Psychology, 18,* 199-214.

Kopp, C. (1989). Regulation of distress and negative emotions: A developmental vicw. *Developmental Psychology, 25,* 243-254.

Matheny, A. P., & Wilson, R. S. (1981). Developmental tasks and rating scales for the laboratory assessment of infant temperament. *JSAS Catalog of Selected Documents in Psychology, 11,81.*

Pettit, G. S., & Bates, J. E. (1989). Family interaction patterns and children's behavior problems from infancy to 4 years. *Developmental Psychology, 25,* 413-420.

Rothbart, M. K., & Derryberry, D. (1981). Development of individual differences in temperament. In M. E. Lamb & A. L. Brown (Eds.), *Advances in developmental psychology* (pp. 37-86). Hillsdale, N.J: Erlbaum.

Rothbart, M. K., Posner, M., & Boylan, A. (1990). Regulatory mechanisms in infant development. In J. T. Enns (Ed.), *The development of attention: Research and theory* (pp. 47-66). New York: Elsevier Science.

Rubin, K. H., Coplan, R. J., Fox, N. A., & Calkins, S. D. (1995). Emotionality, emotion regulation and preschooler's social adaptation. *Development and Psychopathology,* 7,49-62.

Stifter, C. A., & Braungart, J. M. (1995). The regulation of negative reactivity in infancy: Function and development. *Developmental Psychology, 31,* 448-455.

Stifter, C. A., & Fox, N. A. (1990). Infant reaetivity: Physiologieal correlates of newborn and 5-month temperament. *Developmental Psychology, 26,* 582-588.

Troniek, E. Z. (1989). Emotions and emotional communication in infants. *American Psychologist, 44,* 112-119.