



The expression and regulation of anger in toddlers: Relations to maternal behavior and mental representations

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ABSTRACT

Anger is an intense and adaptive approach emotion that undergoes significant development during the toddler years. We assessed the expression of anger and the strategies toddlers use to regulate it in relation to maternal behavior and mental representations. Seventy-four toddlers were observed in three anger-eliciting paradigms: toy removal (TR), still-face (SF), and delayed gratification (DG). Anger expression and three clusters of regulatory behaviors were micro-coded: putative regulatory behaviors, attention manipulation, and play behaviors. Maternal relational style was coded for sensitivity and intrusiveness, and mental representations of the mother–child relationship were assessed for joy and anger. Children expressed the most anger during the TR, less during the SF, and minimally during the DG. Use of putative regulatory behaviors was highest during the SF, whereas during the TR children employed newly acquired skills, such as focused attention and substitutive play, in the service of anger regulation. Anger expression and regulation were differentially related to the negative and positive components in the mother's behavior and representations, and maternal intrusiveness moderated the relations between angry representations and the degree of child anger during the SF. Results are consistent with dynamic models of emotions and accord with perspectives that emphasize the role of sensitive parenting in facilitating emotion regulation.

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Anger, an emotion evoked when one's goals are blocked or one experiences insult to the self or significant other (Fridja, 1986; Lazarus, 1991; Lewis & Ramsay, 2005), is an intense adaptive approach emotion that requires the mastery of efficient regulatory strategies for proper functioning. Anger elicits a strong physiological response in brain activation (Siever, 2008), hormonal release (Lewis, Ramsay, & Sullivan, 2006), and autonomic reaction (Blair & Peters, 2003), and although anger typically lasts for short durations, these brief episodes carry a high impact (Berkowitz & Harmon-Jones, 2004). The expression of anger undergoes developmental changes during the toddler years. Although infants can express negative emotions and protest (Posner & Rothbart, 1998, 2000) and can detect facial expressions of anger (Grossmann, Striano, & Friederici, 2007), anger in its robust expression is first observed during the toddler years, along with the consolidation of aggressive behavior (Campbell, Shaw, & Gilliom, 2000; Del Vecchio & O'Leary, 2006; Hughes, White, Sharpen, & Dunn, 2000). In this study, we examined the expression of toddlers' anger and the behaviors children use to regulate it in relation to the childrearing context, assessed by the mother's global relational style and mental representations.

Research on negative and positive emotions often distinguishes between the expression of emotion and the regulation of emotions (Garber & Dodge, 1991; Posner & Rothbart, 2000). The expression of emotions is observed through distinct

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facial configurations that cohere into a single primary emotion (Campos, Thein, & Owen, 2003; Izard, 1991). Emotions are perceived as distinct starting from the first months of life, are accompanied by specific physiological markers, and their communicative meaning is consistent across cultures (Campos et al., 2003; Camras, 1992; Izard, 1991). Emotion regulation addresses changes related to activated emotions (Cole, Martin, & Dennis, 2004) and describes the “extrinsic and intrinsic processes for monitoring, facilitating, and inhibiting heightened levels of positive and negative affect” (Buss & Goldsmith, 1998, p. 359). According to theories of temperament (Derryberry & Rothbart, 1997; Lemery, Goldsmith, Klinnert, & Mrazek, 1999), the expression of emotion, which marks the intensity of expressed affect, and the regulation of emotion, describing the strategies individuals use to modulate emotions, are central dimensions of temperament. In the case of anger, regulation refers to the mechanisms that enable toddlers to minimize their anger in real time.

Toddlers’ regulation of negative emotions, in general, and anger, in particular, may be observed along several clusters of behaviors. Putative regulatory behaviors are those that clearly display the child’s regulatory effort, such as self soothing, calming self-talk, or proximity seeking. Other regulatory behaviors, such as manipulation of attention and engagement in play, may serve a regulatory function at certain moments of distress but are not inherently regulatory in nature. Putative regulatory behaviors are part of the infant’s regulatory repertoire beginning at birth, serve an adaptive survival function, and have shown to decrease negative emotions in stressful contexts already in the first months of life, for instance, during the still-face paradigm (Adamson & Frick, 2003; Buss & Goldsmith, 1998; Stifter & Braungart, 1995). Similarly, infants as young as a few weeks old can divert attention from the source of distress (Derryberry & Rothbart, 1997; Kopp, 1982), and those who were better able to divert from a distressing stimulus were reported by their mothers as exhibiting less anger at three years (Crockenberg, Leerkes, & Barrig Jo, 2008). With the maturation of attention skills, infants learn to use focused attention as an effortful strategy for emotion regulation, and such effortful regulation decreases negative emotions in stressful contexts (Kopp, 2009). At 8–10 months, infants’ focused attention was found to predict better regulation of negative emotions (Kochanska, Coy, Tjebkes, & Husarek, 1998). Finally, during the second year, infants increase the use of toy exploration and learn to employ symbolic acts, such as substitutive play, to regulate negative emotions (Braungart-Rieker & Stifter, 1996; Bretherton & Beeghley, 1982; Buss & Kiel, 2004; Grolnick, Bridges, & Connell, 1996). Toddlers differ in their use of putative regulatory behaviors, attention manipulation, or exploratory and substitutive play as well as in the efficiency of these tactics in reducing negative affect and anger (Grolnick et al., 1996; Mischel, 1974).

The consolidation of the anger response in toddlers depends, to a large extent, on the childrearing context. Although children’s anger and regulatory competence are shaped by their parents through a variety of genetic mechanisms (Brendgen et al., 2008; van Goozen & Fairchild, 2008), the role of the mother as providing an overall framework for the regulation of negative emotions is emphasized by theoretical perspectives ranging from animal research (Meaney, 2001) to psychoanalytic theories of affect (Winnicott, 1971) and attachment theory (Bowlby, 1969). These perspectives suggest that “relationships are regulators” (Hofer, 1984) and function to assist immature organisms in developing regulatory skills through early interactions that contain a set of bio-social provisions (Feldman, 2009; Hofer, 1995). It has been suggested that the positive components in the mother’s behavior and representations, indexed by her sensitive behavior and coherent representations of attachment, promote efficient regulation (Feldman, 2007a; Kopp, 1982), while the negative elements, including intrusive behavior and angry mental states, increase anger (Dadds & Rhodes, 2008).

The associations between the positive and negative components in the maternal approach and toddlers’ anger response may be observed at the level of interactive behavior and at the level of mental representations. A sensitive maternal style characterized by positive affect and responsiveness to the child’s signals increases self-regulation in toddlers (Feldman, Greenbaum, & Yirmiya, 1999; Kochanska, Aksan, Prisco, & Adams, 2008). Conversely, interactions colored by maternal intrusiveness are associated with child aggression and unregulated anger (Eiden, Edwards, & Leonard, 2007; Johnson et al., 2002; Wood, 2006). It is thus likely that whereas sensitive mothering would be associated with less child anger and more adequate regulatory tactics, intrusive and controlling parenting would predict more anger and inefficient regulation in the toddler years.

As to maternal representations, it has been shown that representations marked by joy and narrated in a coherent and rich style correlate with sensitive mothering and emotion regulation (Dollberg, Feldman, & Keren, 2010; George & Solomon, 1996; Slade, Belsky, Aber, & Phelps, 1999), while those permeated by anger are associated with intrusive mothering and child dysregulation (Dollberg et al., 2010; Main & Goldwyn, 1984). During the third year, the mother’s expressed anger increases, in parallel with the child’s emerging mobility, defiance, and the transformation of the infancy distress into clear signs of anger. At the same time, maternal representations become colored by more anger (Aber, Belsky, Slade, & Crnic, 1999). This sensitive period in the consolidation of the anger response – when children’s anger becomes more notable, mothers’ representations and behavior are marked by more anger, and toddlers begin to develop complex mechanisms for anger regulation – may provide an important time window for the fine-grained assessment of anger as it is shaped by the maternal behavioral style and representational world.

In light of the above, the present study examined anger in the toddler years in relation to the childrearing context. Few studies have focused on the dynamic micro-level real-time organization of anger in toddlers and none have examined anger in relation to maternal behavior and mental representations. Anger was assessed in three contexts that block the child’s goals. In the toy removal paradigm (Goldsmith & Rothbart, 1994), a procedure designed to elicit anger in young children, the child’s sense of fairness is violated when an attractive toy is taken away. In the toddler still-face paradigm, an adaptation of the infant still-face paradigm, mother–child mutual play is interrupted with the withdrawal of the mother’s affective communication, which violates the child’s social expectations. In the delayed gratification paradigm children are required to refrain from

touching attractive sweets until allowed (Feldman & Sarnat, 1986). This procedure blocks the child's goal but does not violate the natural order of social action. Anger expression was defined on the basis of the specific facial configuration, vocalizations, and body movements that mark anger (Buss & Kiel, 2004). Three clusters of regulatory behaviors were examined in each context: putative regulatory behaviors, including self soothing, calming self-talk, and proximity seeking behavior; attention manipulation behavior, including attention diversion and focused attention, and play behavior, including exploration and substitutive play.

Two overall goals guided the study. First, we examined the amount of anger expression and three clusters of regulatory behaviors in each context. It was expected that the toy removal context would elicit the most anger, as this paradigm blocks the child's goals through the volitional action of the other that is experienced as both active and unfair, as compared to the maternal still face, which is a more passive violation of expectation. The delayed gratification context was expected to elicit the least anger, due to its conformity with social norms. As to individual stability, studies assessing toddlers' negative emotions (Grolnick et al., 1996) and anger (Buss & Kiel, 2004) across contexts showed that anger expression changes according to contextual parameters. Similarly, Kochanska et al. (1998) found little stability in anger across episodes. Consistent with perspectives that highlight the context-specific nature of emotions (Lewis & Granic, 2000; Russell & Barrett, 1999), no stability was hypothesized.

Second, we examined children's anger expression and regulation in relation to the childrearing context. Based on theories assessing emotion regulation from an attachment perspective (Bowlby, 1969; Cassidy, 1994), maternal sensitivity was expected to predict lower child anger and greater use of adequate regulatory behavior. Intrusive mothering has shown to increase child frustration (Cassidy, 1994) and thus, maternal intrusiveness was expected to correlate with more anger. Similarly, maternal representations marked by joy and narrated with coherence and richness were expected to correlate with less anger while those colored by anger were expected to correlate with higher anger expression. Finally, we examined whether the mother's sensitive and intrusive behavior would moderate the relations between the maternal positive and negative representations and the child's expression of anger.

1. Method

1.1. Participants

Seventy-four Israeli toddlers (35 boys) aged 2–3 years ($M = 30.56$ months, $SD = 4.17$ months, range = 24–36 months) participated in the study. Mothers and toddlers were recruited through ads in children's nurseries, and all families were of middle-class background. All children were raised in two-parent families, and both parents completed at least 12 years of education with the vast majority (87%) holding an academic or vocational degree. Mothers' mean age was 34.12 years ($SD = 3.98$), they completed, on average, 15.4 ($SD = 2.43$) years of education, and the families had an average of 1.77 children ($SD = .85$).

1.2. Procedure

Two home visits of approximately 2 h each were conducted with each family. In the first visit, mothers and children were videotaped in several interactive and emotion-eliciting procedures. These included (in the following order): mother–child free play, mother–child symbolic play, mother–child still-face (SF), experimenter–child toy removal (TR), experimenter–child bubbles, and mother–child delayed gratification (DG). In the second visit, conducted in the morning when the child was not present, mothers were interviewed using the Parent Development Inventory (PDI, Slade et al., 1993), a 90-min semi-structured interview that taps the mother's representations of the child, the mother–child relationship, and perception of the maternal role. During the videotaped sessions, the camera was positioned to capture the child's face (TR) and the child's face and the mother's face and body (free play, SF, DG). The symbolic and bubble play were not included in the present study.

1.2.1. Mother–child free play

Mothers and children were given a ball, a hoola-hoop, and a large play spring and were videotaped playing with the toys for 10 min.

1.2.2. Still-face (SF)

Following the symbolic play, mothers were asked to refrain from social interaction and maintain a “still-face” for 3 min and then resume typical play for 2 min. Mothers were informed on the procedure in advance and were cued in moving between the episodes. The “still-face” procedure has been studied extensively in infancy (Adamson & Frick, 2003) and is currently adapted to research in toddlers.

1.2.3. Toy removal (TR)

In this procedure, adapted from the Laboratory Temperament Assessment Battery (LAB-TAB, Goldsmith & Rothbart, 1994), the child received an attractive toy from the experimenter and following a 2-min play by a table, the experimenter took

the toy away and placed it within the child's visual field but outside his/her arms' reach for 2 min. Following, the toy was returned to the child for additional 3 min. Mother remained in the room but was asked to sit far away from the child.

1.2.4. *Delayed gratification (DG)*

In this procedure, developed by Feldman and Sarnat (1986), the experimenter placed a plate with attractive sweets and a bottle of juice on a table and invited mother and child to sit and join a "party". When the child arrived the experimenter explained that she forgot the cups and asked the child not to touch the sweets until she returns. Mother and child waited for the cups at the table for 5 min.

1.2.5. *The parent developmental interview (PDI)*

The PDI is a 45-question interview (Aber, Slade, Berger, Bresgi, & Kaplan, 1985) that assessed the parent's representations of the parent-child relationship with the target child. The interview lasted approximately 1.5–2 h. The PDI has been validated in numerous studies and has shown good psychometric properties, predictive validity, and correlations with maternal behavior and children's emotion regulation, attachment security, and temperament (Aber et al., 1999; Dollberg et al., 2010; Grienenberger, Kelly, & Slade, 2005; Maysless, 2006; Rosenblum, Dayton, & McDonough, 2006; Shamir-Essakow, Ungerer, Rapee, & Safer, 2000; Slade et al., 1999). The interviewer asked the mother to describe her child, herself as a parent, and her relationship with the target child. She is asked to describe moments of dyadic harmony and tension as well as incidents that cause joy or difficulty to the child and herself. Specific questions tap the mother's emotional experiences as a parent, for example, whether she experiences anger in the relationship, when she experience anger, and how she handles moments of anger toward the child.

1.3. *Coding*

1.3.1. *Mother-child free play*

The Coding Interactive Behavior (CIB, Feldman, 1998) system was used to assess maternal sensitivity and intrusiveness. The CIB includes 42 scales, each rated from 1 (low) to 5 (high) after viewing the entire interaction. The CIB has been validated in numerous studies of typically developing and high risk children and has shown good psychometric properties, including construct validity, test-retest reliability, and predictive validity. Studies utilizing the CIB in the toddler years demonstrated the system's sensitivity to age-related changes, interacting partner, cultural variations, and biological and social-emotional risk conditions (Feldman, 2010; Feldman & Eidelman, 2005, 2006, 2009a, 2009b; Feldman, Keren, Gross-Rozval, & Tyano, 2004; Feldman & Klein, 2003; Feldman & Masalha, 2010). Consistent with previous research two composites were used in the present study, each including the following codes.

1.3.2. *Maternal sensitivity ($\alpha = .90$)*

Mother acknowledges child signals, maintains visual contact, expresses positive affect, uses appropriate vocal quality, is resourceful in handling the child's distress or expanding the interaction, maternal style is consistent, mother displays an affective range that matches the child's readiness to interact, mother's adapts interaction to the child's signals.

1.3.3. *Maternal intrusiveness ($\alpha = .81$)*

Mother interrupts the child's activities and overrides the child's communicative intents, mother expresses anger and hostility, the interaction is judged to be parent-led rather than child-led.

Two coders were trained to reliability by the developer of the coding scheme and reliability, conducted on 12 interactions, averaged intraclass $r = .93$ (range = .87–.98). Mean levels of maternal sensitivity for this sample were 3.58 ($SD = .43$) and for intrusiveness 1.71 ($SD = .65$).

1.3.4. *Anger expression and regulatory behavior*

Each of the three emotion-eliciting procedures was micro-coded on a computerized system (Noldus, Co.) for the following variables: Anger Expression, Putative Regulatory Behaviors (self soothing behavior, comforting self-talk, proximity seeking), Attention Manipulation (attention diversion, focused attention), and Play-Related Behavior (exploration, substitutive play). In order to provide a comprehensive assessment on the anger response, we computed the proportions, frequencies, mean durations, and latencies of anger episodes in each context. For the regulatory behaviors, only the proportion of time each behavior occurred was computed (regulatory behaviors were summed as clusters and thus frequencies and mean durations were less informative). Each episode was coded by a separate team of two coders who were trained to 90% reliability by an expert (RN) and then computed inter-rater reliability among themselves.

Anger expression – was coded, consistent with previous research on toddlers' anger (Buss & Kiel, 2004), on the basis of facial expressions including brows pulled in and down, eye lids tensed and eyes narrowed, mouth open and squared, or lips tensed. Angry facial expressions were often accompanied by angry vocalizations and tensed muscle tone and body movements. Anger was coded when it appeared as present or absence, not along a dimension of its intensity.

Anger regulation – Included three categories of behaviors:

- (a) *Putative Regulatory Behaviors*: (1) self-soothing included behaviors, such as thumb sucking, self-hug, hair curling, etc. (2) calming self-talk included encouraging, calming, or reminding self-talk, such as “I’m a big girl”, “Good boy. Don’t touch” and (3) proximity-seeking behavior was coded in the context as actions involving physical closeness to mother, such as sitting on mother, putting head in mother’s lap, etc.

Because attention manipulation and play-related behaviors may or may not serve a regulatory function, these regulatory behaviors were coded *only* if they appeared after the child expressed anger and were judged to assist in the regulation of anger.

- (b) *Attention Manipulation*: (1) attention diversion – was coded when the child looked at the attractive unreachable toy (TR), the mother (SF), or the sweets (DG) and then looked away but gaze was not focused on other objects. (2) focused attention – was similarly coded when the child looked at the attractive toy, the mother, or the sweets and then focused his gaze for at least two seconds on a different object but did not play with the other object using manipulation or substitutive play.
- (c) *Play-Related Behavior*: were coded when the child showed anger and then turned to play with the toys in the following ways: (1) exploration was coded when a child manipulated the toy, for instance, moving a car on the floor, but no symbolic act was observed, and (2) substitutive play was coded when the child showed a symbolic act by constructing a simple or more elaborate imaginary scenario.

Maternal socialization style – were micro-coded for the DG, the setting in which mothers were able to offer active assistance to the child’s frustration. The three maternal socialization styles described by Baumrind (1973) were coded: *no control* – mother allowed the child to eat the sweets without making comments, intervening, or reminding the child of the prohibition, *warm control* – mother showed positive affect combines with control, for instance reminding the child that he/she cannot touch in a gentle voice or diverting attention through play or conversation, and *harsh control* – mother used harsh, angry discipline, such as scolding (e.g., “didn’t she tell you not to touch it?”), insulting (e.g., “you are a bad boy, why did you touch it”), or hitting when child attempts to touch the sweets.

Anger expression, regulatory behaviors, and maternal socialization styles were coded for the anger-eliciting component of the procedure: the period when the toy was away in the TR (not when toy was returned), the SF part of the procedure (not reunion), and the moments when the child was not allowed to touch the sweets (not when he/she were able to eat).

Reliability was computed for 12 sessions and reliability averaged 87%, (range = 81–94%) kappa = .78 (range = .71–.88) in the TR, 89%, (range = 83–96%), kappa = .79 (range = .75–.90) in the SF, and 90% (range = 83–96%), kappa = .85 (range = .78–.92) in the DG.

1.3.5. Parenting development interview – PDI

Maternal representations were assessed using the Parent Development Interview Coding System (Slade et al., 1993). Interviews were transcribed verbatim and then coded globally on a scale from 1 to 9 by coders trained to reliability by the original developers of the instrument. Following instructions of the authors of the PDI (Slade et al., 1999), two composite scores were created by averaging several scales: Anger and Joy/Coherence.

The Anger composite (alpha = .68) included three subscales: *anger level* – the amount of anger mother experiences in the mother – child relationship as expressed in her narrative, *anger control* (reversed) – the degree to which mother is able to contain and regulate her anger, and *anger acknowledgement* (reversed) – the degree to which mother is able to discuss her anger openly and the degree to which the level of expressed anger is judged to be appropriate to the event that triggered it (i.e., mother is able to describe in detail the event that elicited anger, e.g., “he ran home from nursery and stepped all over the floor I just cleaned” and to express appropriate level of anger in response to that event, e.g., “I felt angry but then I realized he was so excited to see me”). The Joy/Coherence composite (alpha = .75) averaged the following three scales. *Joy-pleasure level* – the degree to which mother expressed joy and pleasure in being a parent, in the child, and in the relationship with the target child. *Coherence* – the narrative was judged to be coherent – narrative followed a smooth pattern of discourse and was not disjoint, associative, or included illogical and sudden skips between topics, emotions, or events. Narrative did not fall into long silences and maintained a unitary level of expression (e.g., speaking very concretely and simply about certain emotions or events while using symbolic and complex language about others). *Richness of content* – narrative was judged to be rich – mother could describe vividly different moments with the child and the emotions they evoked, was able to describe a range of emotions and events, and was able to link experiences in her parenting to other experiences in her life and to her childhood memories with her own parents.

Coding was carried out by two raters, trained to reliability by a member of the developing team of the coding scheme. Fifteen randomly selected transcribed interviews were double coded and showed adequate interrater reliability, intraclass $r = .92$ (range = .85–.97). Disagreements were resolved by discussion and raters were blind to information on mother and child. Mean levels of Joy/Coherence for this sample were 5.22 ($SD = 1.15$) and Anger were 2.18 ($SD = .57$)

2. Results

Results are reported in four sections. In the first, mean-level differences in anger expression were tested for the proportions, frequencies, mean durations, and the latencies to the first expression of anger in each context. The second section examined the proportions of each behavior in the three regulatory clusters and assessed cross-context stability in anger

Table 1
Descriptive statistics for anger expression in the three contexts.

Anger Expression	Toy Removal (TR)		Still-Face (SF)		Delayed Gratification (DG)		F
	M	SD	M	SD	M	SD	
Proportions	.06	.09	.04	.08	.02	.04	TR > SF > DG
Frequencies	2.71	2.08	1.36	.96	1.22	1.14	TR > SF, DG
Mean durations (s)	7.98	10.50	5.26	7.81	5.37	3.77	TR > SF, DG

expression and regulatory behavior. The third section addressed maternal correlates of anger expression and regulation. The final section presents three regression equations predicting anger expression in the three contexts from maternal and child factors. The moderating role of maternal behavior on the relations of maternal representations and the child's anger in each context was also tested.

2.1. Anger expression in the three contexts

Three Multivariate analyses of variance (MANOVAs) with repeated measures with child gender as the between-subject factor were used to examine differences between the contexts in terms of the proportions, frequencies, and mean durations of *Anger expression*. Because few studies focused on toddlers' anger response, we wished to provide a comprehensive overview of the micro-level expression of toddlers' anger and thus, the proportions, frequencies, mean durations, and latencies of anger episodes were tested. The repeated polynomial was used in each MANOVA to assess change between each episode and the next.

2.1.1. Anger expression

A repeated-measure MANOVA was conducted for the proportion of time toddlers expressed anger out of the entire episode in each context. A significant main effect was found for context, Sphericity Assumed $F(df=2)=3.44, p<.05, \eta^2=.06$. The proportion of time spent in anger was highest in the TR, declined in the SF, $F(df=1)=3.43, p<.05, \eta^2=.05$, and further declined from the SF to the DG, $F(df=1)=3.92, p<.05, \eta^2=.06$.

A similar repeated-measure MANOVA conducted for frequencies, the number of times children expressed anger during each episode, also showed an overall main effect for context, Sphericity Assumed $F(df=3)=3.71, p<.05, \eta^2=.08$. Angry expressions were most frequent in the TR episode, declined between the TR and the SF, $F(df=1)=3.85, p<.05, \eta^2=.06$, and showed no change from the SF to the DG episode.

A repeated-measure MANOVA for the mean durations, the average length of each anger episode, showed a similar main effect for context, Sphericity Assumed $F(df=3)=3.41, p<.05, \eta^2=.06$. Episodes of anger lasted the longest during the TR episode, declined during the SF, $F(df=1)=3.58, p<.05, \eta^2=.05$, and showed no change from the SF to the DG.

Finally, latencies to the first angry episode were nearly three times as fast during the TR ($M=40.36$ s) and SF ($M=47.54$ s) as compared to the latencies to anger expression during the DG ($M=114.86$ s), $F(df=2, 71)=6.77, p<.02$.

Means for the proportions, frequencies, and mean durations of anger expression across contexts are presented in [Table 1](#). No gender differences were found.

Means presented in [Table 1](#) support our first hypothesis and show that the TR episode, in which the child's goal was actively blocked by a stranger, induced the most anger in terms of the greatest proportion of time spent in anger, highest frequencies of anger episodes, and the longest durations of each anger episode. Yet, these results indicate that even during situations that intend to elicit frustration, moments of anger were infrequent, short in duration, and occupied a small proportion of the episode's time. In all contexts, only between a quarter and approximately a third of the children exhibited a single angry episode (TR = 36.2%; SF = 33.3%, DG = 25%). However, 72% of the children expressed anger in at least one context.

2.2. Anger regulation in the three contexts

Means for the proportions of time toddlers spent in the three regulatory clusters are presented in [Table 2](#).

A repeated-measure MANOVA with child gender as the between-subject factor assessing the three putative regulatory behaviors in the three contexts showed a main effect for context, Sphericity Assumed $F(df=2)=15.23, p<.01, \eta^2=.23$. The use of all putative regulatory behaviors – self-sooth, self-talk, and proximity seeking – were higher during the SF, declined in the TR, $F(df=1)=6.43, p<.01, \eta^2=.08$, and further declined to a minimal level during the DG, $F(df=1)=7.63, p<.01, \eta^2=.09$.

A repeated-measure MANOVA for the attention manipulation measures similarly showed a main effect for context, Sphericity Assumed $F(df=2)=11.36, p<.01, \eta^2=.17$. In contrast to the putative regulatory behaviors, the use of attention manipulation was highest during the TR, declined during the SF, $F(df=1)=6.83, p<.01, \eta^2=.09$, and further declined during the DG, $F(df=1)=8.66, p<.01, \eta^2=.10$.

Finally, a repeated-measure MANOVA for the play-related regulatory behaviors, exploration and substitutive play, showed a main effect for context, Sphericity Assumed $F(df=2)=12.24, p<.01, \eta^2=.19$. Similar to the attention manipulation strategies, the use of play behavior to regulate anger was most prevalent during the TR, declined during the SF, $F(df=1)=7.52, p<.01, \eta^2=.09$, and further declined during the DG, $F(df=1)=8.95, p<.01, \eta^2=.10$. No child gender effects were found.

Table 2

Descriptive statistics for putative regulatory behaviors, attention manipulations, and play-related behavior.

	Toy removal (TR)		Still-face (SF)		Delayed gratification (DG)		F
	M	SD	M	SD	M	SD	
<i>Putative regulatory behavior</i>							
Self-sooth	.02	.01	.04	.01	.004	.00	SF > TR > DG
Calming self-talk	.06	.06	.10	.06	.01	.00	SF > TR > DG
Proximity seeking behavior	.02	.01	.05	.02	.01	.00	SF > TR > DG
<i>Attention manipulation</i>							
Attention diversion	.09	.03	.05	.05	.02	.01	TR > SF > DG
Focused attention	.04	.01	.02	.01	.00	.00	TR > SF > DG
<i>Play-related behaviors</i>							
Exploration	.19	.10	.10	.05	.02	.01	TR > SF > DG
Substitutive play	.13	.06	.07	.03	.02	.01	TR > SF > DG

Overall, these data demonstrate that during the TR, toddlers tend to use behaviors that are not inherently regulatory in nature, such as attention manipulation and play, in the service of anger regulation, whereas during the SF, the use of putative regulatory behaviors, which are inherently soothing, is more common.

2.2.1. Stability across context

Prior to computing stability, behaviors in each of the three regulatory clusters were combined to create a single score (e.g., the proportions of self-sooth, self-talk, and proximity seeking were summed to create the “putative regulatory behavior” construct). In general, anger was not found to be stable across contexts. No correlations were found in the proportions of anger episodes in each context. Similarly, no cross-context correlations were found in any putative regulatory or play behavior. Attention manipulation correlated between the TR and the SF were inter-related, $r = .43, p < .01$, and between the TR and the DG, $r = .26, p < .05$, indicating that the use of attention to regulate negative emotion may be a stable tendency in the child’s orientation to the environment.

2.3. Maternal correlates of anger expression and regulation

2.3.1. Maternal relational style: sensitivity and intrusiveness

As predicted, maternal intrusiveness was related to more anger expression in the TR, $r = .30, p < .05$, and SF, $r = .31, p < .05$. Maternal sensitivity was related to lower child anger in the TR, $r = -.27, p < .05$, to more play behavior in the TR, $r = .30, p < .05$, and to more attention manipulation in the SF, $r = .29, p < .05$. Maternal sensitivity and intrusiveness were negatively correlated, $r = -.41, p < .01$.

2.3.2. Maternal representations: joy and anger

Maternal angry representations were related to the child’s anger expression in the TR, $r = .25, p < .05$, and SF, $r = .24, p < .05$. On the other hand, maternal representation of joy in the relationship was unrelated to the child’s anger expressions and was associated with greater use of attention manipulation during the SF, $r = .28, p < .05$, and more play-related regulatory behavior during the TR, $r = .28, p < .05$. As expected, maternal representations of joy/coherence were related to higher sensitivity, $r = .34, p < .05$, and lower intrusiveness, $r = -.29, p < .05$; whereas representations of anger correlated with higher intrusiveness, $r = .36, p < .01$, but not with lower sensitivity, $r = .20, p > .10$. Maternal representations of joy and anger were negatively associated, $r = -.37, p < .01$.

2.3.3. Maternal socialization style

Finally, correlations between maternal harsh and warm-control disciplinary style and children’s anger expression and regulation were examined for the DG context, the only context where mothers were active participants. Maternal harsh control was related to greater child anger, $r = .27, p < .05$, and warm control to more attention manipulation, $r = .28, p < .05$. Overall, these findings point to the differential links between maternal angry and joyful representations and children’s anger expression and regulation.

2.4. Predicting child anger expression in the three contexts from maternal factors

In the final section, three hierarchical regression equations were computed predicting anger expression in the three contexts from maternal behavior and representations. The criterion variable in each regression was the proportion of anger expression in each episode. Predictors were entered in a theoretically determined order. In the first block, the child’s age in months was entered, to partial out variance related to maturation across the third year. The next two blocks included maternal relational behavior – sensitivity and intrusiveness – and the following two blocks contained the maternal representations – joy/coherence and anger. The final two blocks included interaction terms: maternal sensitivity \times joy and maternal intrusiveness \times angry representations, to assess potential moderation. Results are presented in Table 3.

Table 3
Predicting anger expression during the toy removal, maternal still-face, and delayed gratification episodes.

Criterion	Anger during toy removal			Anger during still-face			Anger during delayed gratification		
	Beta	R change	F change	Beta	R change	F change	Beta	R change	F change
Child age	-.11	.01	1.03	-.17	.03	1.86	-.07	.00	.46
Maternal sensitivity	-.26*	.06	4.41*	-.27*	.07	.47	-.31*	.07	4.28*
Maternal intrusiveness	.29	.06	4.72*	.19	.03	2.65	.18	.03	2.73
Maternal representations-joy	-.04	.01	.98	-.17	.03	2.44	-.02	.00	.39
Maternal representations-anger	.24*	.05	3.99*	.22	.04	3.41	.11	.01	.96
Maternal joy × sensitivity	-.38	.01	.81	-.36	.02	2.16	-.28	.01	1.07
Maternal anger × intrusiveness	.45	.03	1.92	.49*	.06	4.18*	.21	.00	.82
	R total = .23; $F(2, 65) = 2.93, p < .05$			R total = .28; $F(2, 65) = 3.52, p < .01$			R total = .12; $F(2, 65) = 1.94, p > .10$		

* $p < .05$.

As seen in Table 3, the regressions predicting anger expression in the TR and SF were significant, whereas the one predicting anger in the DG was not. In the TR, three separate effects on children's anger expression emerged: lower maternal sensitivity, higher intrusiveness, and maternal representations colored by anger. No interaction effects were found. During the SF, toddlers' anger was predicted by lower maternal sensitivity and the interaction of maternal intrusiveness and angry representations. Among children of mothers high on intrusiveness (using the median split), those with mothers that expressed angry representations displayed more anger, $F(df = 1, 35) = 4.05, p < .05$. However, among children of low-intrusiveness mothers, higher angry representations were unrelated to more child anger, $F(df = 1, 33) = 1.97, p > .10$.

3. Discussion

Anger is unique among the emotions in its combination of very high intensity, adaptive approach orientation, and a strong negative valence and the need to master adequate strategies for the regulation of anger begins in the toddler years and continues throughout life. When used in a dysregulated fashion, anger may lead to the development of aggressive behavior and various forms of psychopathology are marked by an impaired ability to regulate anger (Hill, 2002; Hughes et al., 2000), and, thus, understanding the expression of anger in toddlers in relation to the childrearing context may be of interest. In this study, we examined toddlers' anger by microanalytically coding anger expressions and the behavior toddlers use to regulate it in three contexts that block the child's goals. Results demonstrate that the toy removal episode, in which children's goals were actively blocked by a stranger, elicited the most anger; the still-face paradigm, in which the child's expectation of continued social communication with the mother was blocked by the mother's passively refraining from interaction, elicited less anger, while the delayed gratification paradigm, which called for self-restraint within a social context, elicited minimal anger, possibly as children experienced the blocking of their goal as following social conventions. Three clusters of regulatory behaviors were tested. Putative regulatory behaviors, which are inherently regulatory in nature, were highest during the SF paradigm, while the use of behaviors that are not necessarily regulatory but may be employed in the service of anger management, such as exploratory play and attention manipulation, were highest during the toy removal. Finally, toddlers' anger expression and regulation were differentially related to maternal behavior and mental representations: anger correlated with intrusive behavior and angry representations, whereas sensitive mothering and maternal representations marked by joy and coherent narrative were related to less anger and the use of adequate regulatory behaviors. Overall, the findings that both the expression and regulation of anger were context specific and were not stable across episode may be consistent with dynamic models on emotions, which suggest that emotions unfold in real time through moment-by-moment interactions between emotion and context (Fogel, 1993; Hoeksma, Oosterlaan, & Schipper, 2004; Lewis & Granic, 2000). The findings also accord with the attachment perspective on emotions (Cassidy, 1994), which highlights the importance of sensitive caregiving for emotion regulation.

In general, the data indicate that the expression of anger in this low risk sample was relatively infrequent, short in duration, and occupied a small proportion of the episode's time. In comparison with these short moments of anger, the use of regulatory strategies, even those that are inherently self-soothing, lasted significantly longer. These findings are consistent with perspectives suggesting that even brief moments of anger often exert a marked impact on physiology and behavior and require extensive regulatory efforts (Berkowitz & Harmon-Jones, 2004). Although the proportions of anger were low, nearly three quarters of the children exhibited anger at least once and little stability was found in their anger response. Similar findings are reported by Grolnick et al. (1996), who found little cross-context stability in toddlers' negative emotions and highest levels of distress during the toy removal. Possibly, different frustrating situations induce anger in different individuals and longitudinal research is required to assess whether such sensitivities persist over time and shape children's development.

Children's use of specific strategies to regulate anger similarly showed little cross-context stability, apart from attention manipulation which showed stability and may tap children's habitual mode of orientation to the environment. During the

still-face, children used more putative regulatory behaviors, whereas during the toy removal, toddlers employed newly acquired skills, such as focused attention and exploratory and substitutive play, in the service of anger regulation. Buss and Kiel (2004), assessing toddlers' anger, fear, and sadness across contexts, concluded that toddlers change their emotional expressions according to specific social goals in relation to the mother. Possibly, the presence of the unavailable mother led toddlers to use more self-soothing and proximity-seeking behaviors in order to elicit the maternal response. These findings echo attachment-based research, which showed that proximity-seeking behavior increased when maternal availability was inconsistent (Cassidy, 1994). On the other hand, during the toy removal episode, when the mother was not present, children needed to find more autonomous ways to contain their anger and turned to more mature strategies, such as the use of attention manipulation, exploration, and substitutive play for the regulation of anger.

Children's anger expression and regulation were related to both maternal behavior and mental representations. Maternal sensitivity correlated with lower anger expression and the use of more mature regulatory strategies in the face of frustration. The mother's sensitive style experienced in the first years, which combines the expression of positive relational indicators, with synchronous adaptation to the child's signals, has been linked with more optimal social-emotional outcomes including attachment security across the lifespan (Sroufe, 2005), empathy and moral development across childhood (Feldman, 2007b), and social adaptation in adolescence (Jaffari-Bimmel, Juffer, van IJZendoorn, Bakerman-Kranenburg, & Mooijaart, 2006). Sensitive mothering is a relatively stable trait as seen in research spanning from infancy to adolescence (Belsky, Rovine, & Taylor, 1984; Feldman, 2010; Feldman & Eidelman, 2005, 2006, 2009a, 2009b). It has been suggested that the provisions embedded in early relationships function as bio-behavioral regulators (Hofer, 1984) that help immature organisms achieve a state of quiescence following perturbation. The present findings may similarly suggest that the internalized experience of sensitivity helped toddlers contain their anger in real time when the mother was absent (TR) or unavailable (SF). On the other hand, the mother's intrusive style, which has been linked with disruptive behavior and externalizing problems, correlated with child anger. It thus appears that the positive, growth promoting elements in the maternal style facilitate the child's ability to contain anger whereas the negative elements model more angry behavior from mother to child and deprive the child of the components in the maternal approach that foster self-regulation.

Similar findings emerged with regards to the mother's attachment-related representations. Representations of the mother-child relationship that were colored by joy and narrated with richness and coherence correlated with less anger and adequate regulation, whereas maternal angry narrative was associated with greater child anger. During the toy removal, maternal sensitive and intrusive behavior and the mother's angry representations each explained a unique variance, suggesting that behavior and representations chart distinct pathways to the expression of child anger. During the still-face, however, maternal intrusive behavior moderated the relations between angry representations and child anger. Possibly, when the mother is present, her behavioral repertoire is the more pronounced pathway and the mother's anger representations impact the child's overt anger only inasmuch as they are expressed in her actual behavior. Attachment theory highlights the role of mental representations in the cross-generation transmission of emotion regulation by shaping daily interactive behavior (Fonagy, Gergely, Jurist, & Target, 2002). The current results similarly demonstrate links between sensitive and intrusive behavior with joy and anger representations respectively, pointing to a bi-directional influence between representation and behavior in the formation of the mother's global attitude toward her child. The present study may thus contribute to the discussion on the cross-generation transmission of emotion regulation by focusing on the development of anger. The mother's angry representations of attachment with her child, which are likely rooted in her own experience of being cared for as a child with harsh parenting, were found to correlate with angry and intrusive maternal behavior, which – either directly (TR) or indirectly through intrusive behavior (SF) – diminish the child's capacity to handle the frustrations embedded in everyday life.

Limitations of the study relate to the homogenous composition of the sample, which comprised only two-parent, middle-class families, the lack of father data to shed light on the contribution of the father to children's (especially boys') anger response, and the lack of longitudinal assessment to address the effects of toddlers' anger on their later social-emotional growth or assess the continuity in the child's context-specific use of regulatory tactics. Similarly, the proportion of anger behavior observed in the current sample were low and there may be a need to assess children in more anger-producing contexts or evaluate children who are more anger-prone due to family conditions, such as domestic violence to understand the phenomenon of anger more fully. It is also possible that the low proportions of anger were partially related to the lack of stability in children's anger response across contexts. Much further research is required to chart the anger response as it develops from toddlerhood to adult life in normative and high risk populations; specify the brain, hormonal, and autonomic correlates of anger expression and regulation; and test the impact of the larger social and cultural context on the way individuals express anger. As aggression is currently among the world's most pressing problems and is typically underlay by dysregulated anger, a better understanding of the anger response and the mechanisms available for its modulation during the period when anger and aggression first consolidate may provide new insights on the roots of aggressions and the potential for its control.

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References

- Aber, J., Belsky, J., Slade, A., & Crnic, K. (1999). Stability and change in mothers' representations of their relationship with their children. *Developmental Psychology*, *35*, 1038–1047.
- Aber, J., Slade, A., Berger, G., Bresgi, I., & Kaplan, M. (1985). *The parent development interview*. Unpublished manuscript. Columbia University.
- Adamson, L., & Frick, I. (2003). The still-face: A history of a shared experimental paradigm. *Infancy*, *4*, 451–473.
- Baumrind, D. (1973). The development of instrumental competence through socialization. In A. D. Pick (Ed.), *Minnesota symposia on child psychology* (pp. 3–46).
- Belsky, J., Rovine, M., & Taylor, D. G. (1984). The Pennsylvania Infant and Family Development Project. III: The origins of individual differences in infant–mother attachment: Maternal and infant contributions. *Child Development*, *55*, 718–728.
- Berkowitz, L., & Harmon-Jones, E. (2004). Toward an understanding of the determinants of anger. *Emotion*, *4*, 107–130.
- Blair, C., & Peters, R. (2003). Physiological and neurocognitive correlates of adaptive behavior in preschool among children in Head Start. *Developmental Neuropsychology*, *24*, 479–497.
- Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment*. New York: Basic Books.
- Braungart-Rieker, J. M., & Stifter, C. A. (1996). Infants' responses to frustrating situations: Continuity and change in reactivity and regulation. *Child Development*, *67*, 1767–1779.
- Brendgen, M., Boivin, M., Vitaro, F., Girard, A., Dionne, G., & Pérusse, D. (2008). Gene–environment interaction between peer victimization and child aggression. *Development and Psychopathology*, *20*, 455–471.
- Bretherton, I., & Beehley, M. (1982). Talking about internal states: The acquisition of an explicit theory of mind. *Developmental Psychology*, *18*, 906–921.
- Buss, K. A., & Goldsmith, H. H. (1998). Fear and anger regulation in infancy: Effects on the temporal dynamics of affective expression. *Child Development*, *69*, 359–374.
- Buss, K. A., & Kiel, E. J. (2004). Comparison of sadness, anger, and fear facial expressions when toddlers look at their mothers. *Child Development*, *75*, 1761–1773.
- Campbell, S. B., Shaw, D. S., & Gilliom, M. (2000). Early externalizing behavior problems: Toddlers and preschoolers at risk for later maladjustment. *Development and Psychopathology*, *12*, 467–488.
- Campos, J. J., Thein, S., & Owen, D. (2003). A Darwinian legacy to understanding human infancy: Emotional expressions as behavior regulators. *Annals of the New York Academy of Sciences*, *1000*, 110–134.
- Camras, L. A. (1992). Expressive development and basic emotions. *Cognition and Emotion*, *6*, 269–283.
- Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. *Monographs for the Society for Research in Child Development*, *59*(2–3), 228–249.
- Cole, P. M., Martin, S. E., & Dennis, T. A. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development*, *75*, 317–333.
- Crockenberg, S. C., Leerkes, E. M., & Barrig Jo, P. S. (2008). Predicting aggressive behavior in the third year from infant reactivity and regulation as moderated by maternal behavior. *Development and Psychopathology*, *20*, 37–54.
- Dadds, M. R., & Rhodes, T. (2008). Aggression in young children with concurrent callous-unemotional traits: Can the neurosciences inform progress and innovation in treatment approaches? *Philosophical Transactions of the Royal Society of London*, *363*, 2567–2576.
- Del Vecchio, T., & O'Leary, S. G. (2006). Antecedents of toddler aggression: Dysfunctional parenting in mother–toddler dyads. *Journal of Clinical Child and Adolescent Psychology*, *35*, 194–202.
- Derryberry, D., & Rothbart, M. K. (1997). Reactive and effortful processes in the organization of temperament. *Development and Psychopathology*, *9*, 633–652.
- Dollberg, D., Feldman, R., & Keren, M. (2010). Maternal representations, child psychiatric status, and mother–child relationship in clinic-referred and non-referred infants. *European Journal of Child & Adolescent Psychiatry*, *19*, 25–36.
- Eiden, R., Edwards, D., & Leonard, E. P. K. E. (2007). A conceptual model for the development of externalizing behavior problems among kindergarten children of alcoholic families: Role of parenting and children's self-regulation. *Developmental Psychology*, *43*, 1187–1201.
- Feldman, R. (1998). *Coding interactive behavior*. Unpublished manual. Bar-Ilan University.
- Feldman, R. (2007a). Parent–infant synchrony and the construction of shared timing: Physiological precursors, developmental outcomes, and risk conditions. *Journal of Child Psychology and Psychiatry*, *48*, 329–354.
- Feldman, R. (2007b). Mother–infant synchrony and the development of moral orientation in childhood and adolescence: Direct and indirect mechanisms of developmental continuity. *American Journal of Orthopsychiatry*, *77*, 582–597.
- Feldman, R. (2009). The development of regulatory functions from birth to 5 years: Insights from premature infants. *Child Development*, *80*, 544–561.
- Feldman, R. (2010). The relational basis of adolescents' adjustment: Mother–child relational patterns from infancy to adolescence shape adolescent adaptation. *Attachment and Human Development*, *12*, 173–192.
- Feldman, R., & Eidelman, A. I. (2005). Does a triplet birth pose a special risk for infant development? Assessing cognitive development in relation to intrauterine growth and mother–infant interaction across the first two. *Pediatrics*, *115*, 443–452.
- Feldman, R., & Eidelman, A. I. (2006). Neonatal state organization, neuro-maturation, mother–infant relationship, and the cognitive development of small-for-gestational-age premature infants. *Pediatrics*, *118*, e869–e878.
- Feldman, R., & Eidelman, A. I. (2009a). Biological and environmental initial conditions shape the trajectories cognitive and social-emotional development across the first five years of life. *Developmental Science*, *12*, 194–200.
- Feldman, R., & Eidelman, A. I. (2009b). Triplets across the first 5 years: The discordant infant at birth remains at developmental risk. *Pediatrics*, *124*, 316–323.
- Feldman, R., Greenbaum, C. W., & Yirmiya, N. (1999). Mother–infant affect synchrony as an antecedent to the emergence of self-control. *Developmental Psychology*, *35*, 223–231.
- Feldman, R., Keren, M., Gross-Rozval, O., & Tyano, S. (2004). Mother and child's touch patterns in infant feeding disorders: Relation to maternal, child, and environmental factors. *Journal of the American Academy of Child and Adolescent Psychiatry*, *43*, 1089–1097.
- Feldman, R., & Klein, P. S. (2003). Toddlers' self-regulated compliance with mother, caregiver, and father: Implications for theories of socialization. *Developmental Psychology*, *39*, 680–692.
- Feldman, R., & Masalha, S. (2010). Parent–child and triadic antecedents of children's social competence: Cultural specificity, shared process. *Developmental Psychology*, *46*, 455–467.
- Feldman, S. S., & Sarnat, L. (1986). Israeli town and Kibbutz toddlers' compliance and adults' control attempts. *Merrill-Palmer Quarterly*, *32*, 365–382.
- Fogel, A. (1993). *Developing through relationships: Origins of communication, self and culture*. Chicago: University of Chicago Press.
- Fonagy, P., Gergely, G., Jurist, E., & Target, M. (2002). *Affect regulation, mentalization and the development of the self*. New York, NY: Other Press.
- Fridja, N. (1986). *The emotions*. Cambridge, England: Cambridge University Press.
- Garber, J., & Dodge, K. (1991). *The development of emotion regulation and dysregulation*. Cambridge, England: Cambridge University Press.
- George, C., & Solomon, J. (1996). Representational models of relationships: Links between caregiving and attachment. *Infant Mental Health Journal*, *17*, 198–216.
- Goldsmith, H. H., & Rothbart, M. K. (1994). *The laboratory temperament assessment battery*. Madison, WI: University of Wisconsin.
- Grienerberger, J., Kelly, K., & Slade, A. (2005). Maternal reflective functioning, mother–infant affective communication, and infant attachment: Exploring the link between mental states and observed caregiving behavior in the intergenerational transmission of attachment. *Attachment and Human Development*, *7*, 299–311.
- Grolnick, W. S., Bridges, L. J., & Connell, J. P. (1996). Emotion regulation in two-year-olds: Strategies and emotional expression in four contexts. *Child Development*, *67*, 928–941.

- Grossmann, T., Striano, T., & Friederici, A. D. (2007). Developmental changes in infants' processing of happy and angry facial expressions: A neurobehavioral study. *Brain & Cognition*, *64*, 30–41.
- Hill, J. (2002). Biological, psychological and social processes in the conduct disorders. *Journal of Child Psychology and Psychiatry*, *43*, 133–164.
- Hoeksma, J. B., Oosterlaan, J., & Schipper, E. M. (2004). Emotion regulation and the dynamics of feelings: A conceptual and methodological framework. *Child Development*, *75*, 354–360.
- Hofer, M. A. (1984). Relationships as regulators: A psychobiologic perspective on bereavement. *Psychosomatic Medicine*, *46*, 183–197.
- Hofer, M. A. (1995). Hidden regulation: Implication for a new understanding of attachment, separation, and loss. In S. Golberg, R. Muir, & J. Kerr (Eds.), *Attachment theory: Social development and clinical perspectives* (pp. 203–230). Hillsdale, NJ: The Analytic Press.
- Hughes, C., White, A., Sharpen, J., & Dunn, J. (2000). Antisocial, angry, and unsympathetic: "Hard-to-manage" preschoolers' peer problems and possible cognitive influences. *Journal of Child Psychology and Psychiatry*, *41*, 169–179.
- Izard, C. E. (1991). *The psychology of emotions*. New York: Plenum.
- Jaffari-Bimmel, N., Juffer, F., van IJZendoorn, M. H., Bakerman-Kranenburg, M. J., & Mooijaart, A. (2006). Social development from infancy to adolescence: Longitudinal and concurrent factors in an adoption sample. *Developmental Psychology*, *42*, 1143–1153.
- Johnson, A. L., Morrow, C. E., Accornero, V. H., Xue, L., Anthony, J. C., & Bandstra, E. S. (2002). Maternal cocaine use: Estimated effects on mother–child play interactions in the preschool period. *Journal of Developmental & Behavioral Pediatrics*, *23*, 191–202.
- Kochanska, G., Aksan, N., Prisco, T. R., & Adams, E. E. (2008). Mother–child and father–child mutually responsive orientation in the first 2 years and children's outcomes at preschool age: Mechanisms of influence. *Child Development*, *79*, 30–44.
- Kochanska, G., Coy, K. C., Tjebkes, T. L., & Husarek, S. J. (1998). Individual differences in emotionality in infancy. *Child Development*, *69*, 375–390.
- Kopp, C. B. (1982). Antecedents of self-regulation: A developmental perspective. *Developmental Psychology*, *18*, 199–214.
- Kopp, C. B. (2009). Emotion-focused coping in young children: Self and self-regulatory processes. *New Directions for Child and Adolescent Development*, *124*, 33–46.
- Lazarus, R. S. (1991). *Emotion and adaptation*. New York: Oxford University Press.
- Lemery, K. S., Goldsmith, H. H., Klinnert, M. D., & Mrazek, D. A. (1999). Developmental models of infant and childhood temperament. *Developmental Psychology*, *35*, 189–204.
- Lewis, M. D., & Granic, I. (Eds.). (2000). *Emotion, development, and self-organization: Dynamic systems approaches to emotional development*. Cambridge, England: Cambridge University Press.
- Lewis, M., & Ramsay, D. (2005). Infant emotional and cortisol responses to goal blockage. *Child Development*, *76*, 518–530.
- Lewis, M., Ramsay, D., & Sullivan, M. W. (2006). The relation of ANS and HPA activation to infant anger and sadness response to goal blockage. *Developmental Psychobiology*, *48*, 397–405.
- Main, M., & Goldwyn, R. (1984). Predicting rejection of her infant from mother's representation of her own experience: Implications for the abused-abusing intergenerational cycle. *Child Abuse & Neglect*, *8*, 203–217.
- Maysless, O. (2006). *Parenting representations: Theory, research, and clinical implications*. New York: Cambridge University Press.
- Meaney, M. J. (2001). Maternal care, gene expression, and the transmission of individual differences in stress reactivity across generations. *Annual Review of Neuroscience*, *24*, 1161–1192.
- Mischel, W. (1974). *Processes in delay of gratification*. *Personality research* New York: Academic Press., pp. 249–292.
- Posner, M. I., & Rothbart, M. K. (1998). Attention, self-regulation, and consciousness. *Philosophical Transactions of the Royal Society of London B*, *353*, 1915–1927.
- Posner, M. I., & Rothbart, M. K. (2000). Developing mechanisms of self-regulation. *Development and Psychopathology*, *12*, 427–441.
- Rosenblum, K., Dayton, C., & McDonough, S. (2006). Communicating feelings: Links between mothers' representations of their infants, parenting, and infant emotional development. In O. Maysless (Ed.), *Parenting representations: Theory, research, and clinical implications* (pp. 109–148). New York: Cambridge Press.
- Russell, J. A., & Barrett, L. F. (1999). Core affect, prototypical emotional episodes, and other things called emotion: Dissecting the elephant. *Journal of Personality and Social Psychology*, *76*, 805–819.
- Shamir-Essakow, G., Ungerer, J. A., Rapee, R. M., & Safier, R. (2000). Caregiving representations of mothers of behaviorally inhibited and uninhibited preschool children. *Developmental Psychology*, *40*, 899–910.
- Siever, L. J. (2008). Neurobiology of aggression and violence. *American Journal of Psychiatry*, *165*, 429–442.
- Slade, A., Aber, J. Cohen, L., Fiorello, J., Meyer, J., DeSear, P., et al. (1993). *Parent development interview coding system*. Unpublished manuscript. Columbia University.
- Slade, A., Belsky, J., Aber, J., & Phelps, J. (1999). Mothers' representations of their relationships with their toddlers: Links to adult attachment and observed mothering. *Developmental Psychology*, *35*, 611–619.
- Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment and Human Development*, *7*, 349–367.
- Stifter, C. A., & Braungart, J. M. (1995). The regulation of negative reactivity in infancy: Function and development. *Developmental Psychology*, *31*, 448–455.
- van Goozen, S. H., & Fairchild, G. (2008). How can the study of biological processes help design new interventions for children with severe antisocial behavior? *Development & Psychopathology*, *20*, 941–973.
- Winnicott, D. W. (1971). *Playing and reality*. New York: Basic Books.
- Wood, J. J. (2006). Parental intrusiveness and children's separation anxiety in a clinical sample. *Child Psychiatry and Human Development*, *37*, 73–87.