
A Contextual Approach to the Development of Self-regulatory Competencies: The Role of Maternal Unresponsivity and Toddlers' Negative Affect in Stressful Situations

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Abstract

A prospective study examined the effects of maternal unresponsivity and of toddlers' own negative affect on the child's subsequent ability to use effective attentional control strategies in preschool. Maternal and child behaviors were measured in situations that varied in the level of stress to test the hypothesis that behaviors in high stress situations would be more diagnostic of children's subsequent self-regulatory behavior. As predicted, both maternal unresponsivity and toddlers' negative affect, particularly in a high stress as opposed to a low stress situation, predicted children's later use of ineffective attentional control strategies. Similarly, maternal disengagement that occurred contingent to toddlers' distress predicted ineffective attentional control strategies whereas maternal disengagement in response to toddlers' non-distress behaviors did not. The findings supported the utility of a contextual approach to understanding the impact of maternal and child characteristics on the development of self-regulatory skills.

Keywords: maternal unresponsivity; child negative affect; attentional control; contextual analysis

The role of self-regulatory competencies in young children's adjustment has been increasingly recognized as important for understanding human development (Grolnick, McMenemy & Kurowski, 1999a; Kochanska, Coy & Murray, 2001; Mischel, Shoda & Rodriguez, 1989; Stifter, 2002). In particular, delay of gratification, effortful control, compliance with caregivers, and emotion regulation, are proving to be major developmental tasks of early childhood with significant implications for subsequent development. Specifically, they are predictive of a wide range of positive developmental outcomes, such as academic success, prosocial emotions such as

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empathy and conscience, social competence, lower vulnerability for aggression and depression, and overall effective coping with life stressors (e.g. Ayduk, Mendoza-Denton, Mischel, Downey, Peake & Rodriguez, 2000; Bridges & Grolnick, 1995; Eisenberg, Fabes, Nyman, Bernzweig & Pinuelas, 1994; Eisenberg *et al.*, 2000, 2001; Grolnick, Kurowski & Gurland, 1999b; Kochanska, Tjebkes & Forman, 1998; Mischel *et al.*, 1989; Murray & Kochanska, 2002; Rothbart, Ziaie & O'Boyle, 1992; Rothbart, Posner & Hersey, 1995).

The long-term stability and implications of individual differences in self-regulatory competencies has been most extensively examined in the context of children's ability to delay gratification (Mischel *et al.*, 1989). Studies have shown remarkable long-term associations between early delay ability and subsequent academic and social competencies assessed years later in development. For example, preschoolers' waiting time in a laboratory delay situation for a larger, delayed reward preferred over a smaller, but immediately available reward was predictive of academic success, frustration tolerance, and social competencies in adolescence (e.g. Mischel, Shoda & Peake, 1988; Mischel *et al.*, 1989; Shoda, Mischel & Peake, 1990). Follow-up studies indicate that these links remained significant even in adulthood, predicting outcomes such as self-esteem, coping, educational level, and even substance use (Ayduk *et al.*, 2000). Given this long-term continuity in self-regulatory competencies in delay of gratification, it has become especially important to identify relevant antecedents that may contribute to their early development.

A directly relevant study exploring the precursors of children's delay of gratification ability examined the links between toddlers' attentional control strategies in mother-toddler interactions and their self-regulatory competencies later as preschoolers in the delay paradigm (Sethi, Aber, Shoda, Rodriguez & Mischel, 2000). Sethi *et al.*'s (2000) study demonstrated that toddlers of over-controlling mothers who responded to mother's intrusions by moving away from her through distant exploration and self-distraction had better self-regulatory ability in preschool. Specifically, they were less likely to focus attention on the temptations (e.g. rewards) and thus waited longer in the preschool delay paradigm, compared to those who had been unable to move away from a frustrating mother. Broadly, these findings are consistent with studies showing that young children who use distraction strategies, such as looking away from negative stimuli, tend to better regulate negative arousal (e.g. Belsky, Friedman & Hsieh, 2001; Gilliom, Shaw, Beck, Schonberg & Lukon, 2002; Grolnick, Bridges & Connell, 1996; Harman, Rothbart & Posner, 1997; Rothbart *et al.*, 1992).

To further our knowledge of early maternal and child contributions to the development of delay of gratification ability, the present study builds on the Sethi *et al.* (2000) findings by focusing on two important factors previously not examined: maternal responsiveness and the child's negative affect. These factors have been considered central for infants' effective socio-emotional development (Field, 1987, 1994; Isabella & Belsky, 1991; Kopp, 1992; Thompson, 1997; Tronick, 1989), and for the prediction of externalizing and impulsive-control problems (Bates, Bayles, Bennett, Ridge & Brown, 1991; Campbell, 1990; Earls & Jung, 1988), respectively. For example, studies of maternal responsiveness have found that children of clinically depressed mothers who, as a group are less responsive to their child's signals than non-depressed mothers (Biringen & Robinson, 1991; Cohn, Matias, Tronick, Lyons-Ruth & Connell, 1986; Field, 1994), show greater amounts of distress and negative emotionality (Cohn & Tronick, 1988; Field, 1994; Tronick, 1989). Tronick and colleagues postulate that when maternal communicative acts, which provide the infant with an external source of

regulation, become unavailable, it is more difficult for the child to engage in active strategies to self-regulate and rebound from negative emotional states. In a similar vein, studies of young children's negative emotionality have found that children prone to distress are less able to actively redirect their attention away from a forbidden toy than children less prone to distress (Raver, 1996).

Building on this body of previous research, the present study examined, in contexts varying in their potential to elicit stress, the links between maternal responsiveness and child negative affect, to the children's subsequent use of attention deployment strategies in a delay of gratification situation in preschool (see Rodriguez *et al.*, 1989; Sethi *et al.*, 2000). Guided by an organizational model of development (Cicchetti, 1990; Cicchetti & Richters, 1993; Cicchetti & Schneider-Rosen, 1986; Sroufe & Rutter, 1984), and a cognitive-affective processing model of personality (e.g. Mischel & Shoda, 1995), we adopted a contextual assessment strategy to identify the early maternal and child behaviors predictive of preschoolers' self-regulation. Accordingly, maternal unresponsivity and child's negative affect were conceptualized and assessed as situational and developmentally specific characteristics, rather than as global personality or temperamental attributes. The integration of these two theoretical perspectives allowed us to search with more precision for the specific features or attributes of caregiving and the situational and interactional contexts that contribute to the development of effective self-regulatory competencies (see Thompson, 1997, for a similar argument regarding maternal sensitivity and child security of attachment).

A Contextual Approach to the Development of Self-regulatory Competencies

A number of studies have begun to more directly examine individual differences in maternal and child behaviors in response to the situational demands imposed by the specific psycho-social contexts in which mother-child interaction processes occur. Kochanska *et al.* (2001), for example, have examined compliance to maternal requests in demand contexts (Dos and Don'ts) that differentially challenge the child's self-regulatory capacities. In contrast to these specifically contextualized assessments, many studies investigating the maternal contributions to early socio-emotional development assess maternal or child behaviors by incorporating varying contextual elements and aggregating them into their global judgments. For example, the many behaviors encompassed in constructs, such as maternal sensitivity, responsiveness, or control, are usually observed in different contexts that afford a variety of mother-child interactions, and then grouped into single indices that describe each maternal style (Biringen & Robinson, 1991; Crittenden, 1988; Thompson, 1997). As a result, contextual elements that may vary in their 'prognostic' value remain 'unpacked' from the behaviors themselves.

The value of a more contextualized approach has been documented in the past decade by research demonstrating that assessments of individual differences in behavioral or dispositional tendencies may be substantially enhanced by taking careful account of the specific context or situation in which the behavior occurs (Mischel & Shoda, 1995; Mischel, Shoda & Mendoza-Denton, 2002; Shoda, Mischel & Wright, 1994). Such contextualized *if-then*, situation-behavior assessments, identify not only the overall level of a type of behavior but also the stable contexts that give those behaviors their meaning and in which their potential diagnostic or prognostic utility may become most visible. In the present research, we pursued such a contextual analysis to try to unpack the specific contextual 'units' or 'levels' for identifying the

contributions of maternal unresponsivity and of the child's negative affect to the child's self-regulatory development.

To identify these meaningful contextual units for analyzing mother–toddler interactions, we borrowed from personality research a construct relevant to the present analysis, namely the ‘competency-demand hypothesis.’ In personality studies of person–context, *if–then* relations, it has been shown that aversive, frustrating, or stressful (highly demanding) situations are especially diagnostic of individual differences in children's characteristic coping strategies. Aggressive children, for example, have been found to display characteristic aggressive behaviors more distinctively in demanding situations, such as when they are provoked or teased by a peer (Mischel & Shoda, 1995; Shoda, Mischel & Wright, 1993; Wright & Mischel, 1987).

Extending these findings to the present study, we conceptualized two relevant types of contextual demands or ‘if’s’ in terms of *if–then* contingencies. In *situational* demands, situations varied in terms of the emotion and self-regulatory demands imposed on the dyad. In *interactional* demands the social behavior of one member in the dyad was the context, and varied in terms of the emotion and self-regulatory demands that it imposed on the social behavior of the other. Individual differences in response to *situational demands* were assessed using a Modified Strange Situation procedure, which, like the original (used to assess infants' attachment behaviors), is composed of a number of episodes varying in their stress-eliciting potential to the child. Given that attachment behavior is presumably influenced by stressful or dangerous situations (Bowlby, 1969/1982), in some of these episodes mother and child are briefly separated to create a mildly stressful environment in which attachment behaviors can be observed. In other episodes, such as mother and child free-play, mother and child behaviors are observed in a relatively stress-free environment in which attachment behaviors would not be readily activated. In Bowlby's behavioral system analysis (Bowlby, 1969/1982) it is theoretically expected that parental responsiveness displayed in stressful episodes may be more prognostic of secure attachment, emotion regulation, and use of self-regulatory strategies than parental responsiveness displayed in non-stressful episodes. However, studies typically portray care-giving characteristics as global, non-conditional individual differences that are aggregated across contexts. By making explicit the differences in maternal and child behaviors contingent on situational and interactional demands, we can begin to understand their contribution more precisely. The integration of these two theoretical perspectives, namely an organizational model of development and a contextualized ‘if–then’ person–context model of personality, contributes to the understanding of the links between attachment security and self-regulation by identifying the specific combination of behavior-situation features that underlie these potential links.

In line with a competency–demand hypothesis as well as with Bowlby's behavioral system analysis (Bowlby, 1969/1982), we assumed that the mother–child separation episode is a situation that makes high demands on the child's emotional and self-regulatory skills. Because of its anxiety-provoking nature, during separation the young child may have less cognitive and emotional resources available to self-regulate effectively; thus, more primitive modes of functioning may be more readily activated (e.g. Mischel & Shoda, 1995). To the extent that the child is unable to cope with the distress of separation effectively, his/her negative affect and behavior are more likely to be visible even when the mother–child dyad reunites. The child's behavior (e.g. difficulty, irritability), in turn, can adversely affect caregiver responsiveness (Crockenberg, 1981; Lee & Bates, 1985; Rutter & Quinton, 1984). The child's

distress during reunion is likely to create a high demand situation for the mother, and one in which her responsiveness to the child's cues of distress are crucial for helping the child to redirect attention and modulate arousal levels. Thus, lack of mother's responsiveness during a high-need situation such as reunion, and child's high levels of negative affect during separation and reunion, are expected to be most diagnostic of the child's later self-regulatory difficulties.

Second, individual differences in response to contextual demands were also examined at the level of the social interaction. For the child, the meaning of a particular maternal behavior may critically depend on how it fits with the child's needs at the moment. For example, if a mother engages physically with her child in response to his/her cues of distress or discomfort when reunited after a separation, the child may experience his or her mother's behaviors as responsive. However, the child may experience these same maternal behaviors as intrusive if they occur in response to other, non-distress behaviors (e.g. when the child is in play or attending to an object). Although the opportunities for these maternal and child behaviors may be a function of the situational demands (e.g. the likelihood of child distress is clearly higher in a separation than a free-play situation), it is at the level of the *interactional demands* that the maternal behaviors will acquire their meaning. We thus theorized that maternal unresponsive behaviors contingent to child distress would be more detrimental to the development of self-regulatory competencies than maternal unresponsive behaviors contingent to non-distressed behaviors. Identifying such specific mother-child interaction sequences (e.g. mother physically moves away immediately after child cries) required the coding of molecular observations of behavioral instances (i.e. every 10 second segments). To distinguish this conditional, molecular, maternal construct from the molar assessment of maternal unresponsivity, we will refer to it throughout the article as *maternal disengagement* (see full description of assessment of maternal disengagement under Method, below).

In summary, we hypothesized that maternal unresponsivity to their toddlers, and the toddlers' own level of negative affect, will more strongly predict the children's subsequent inability to effectively self-regulate in a delay of gratification task in preschool when they occur in more stressful, demanding situations (e.g. mother-child reunion after separation) than when they occur in less stressful, less demanding situations (e.g. mother-child free play). At the interactional level, maternal disengagement contingent to a toddler's negative affect was expected to be more predictive of the child's use of ineffective attentional control strategies in preschool.

Overview of Dependent Measures

In assessing self-regulatory behavior we focused on the amount of time children were able to wait as well as on the attention deployment strategies that they used while they waited. Previous experimental studies indicate that 'cool' strategies that shift attention away from the rewards are central ingredients for effective delay. In contrast, 'hot' strategies that focus attention on the rewards are detrimental to a child's capacity to deal with the frustration inherent in the delay task. For example, children can wait longer when they are experimentally primed to use distraction techniques while waiting, and to mentally attend to abstract, 'cool' properties of the rewards (e.g. their shape) rather than to their arousing, 'hot' properties (e.g. their taste; see Mischel, Ebbesen & Zeiss, 1972; Mischel *et al.*, 1989; Mischel & Shoda, 1995).

Consistent with findings from experimental studies, individual differences in delay of gratification ability have been found to be mediated by the spontaneous use of cool and hot attentional strategies. For example, studies in which children's eye-gaze patterns were coded while they waited in the delay task indicate that looking away from the rewards and self-distracting (i.e. cool focus) enable children to delay longer whereas fixing eye-gaze on the rewards (i.e. hot focus) leads children to give up waiting (Peake, Hebl & Mischel, 2002; Rodriguez *et al.*, 1989). Thus, based on this previous research, the dependent measures of interest in the present study were the number of seconds children were able to wait for the delayed rewards, and their use of hot and cool attentional strategies during this wait in the preschool delay task.

Method

Participants and Overview of Assessments

Participants were drawn from a larger ongoing longitudinal study ($N = 211$, 104 male) of children's socio-emotional development conducted at a university-affiliated center for toddler care (see Aber & Baker, 1990, for a full description of the center and research assessments). To apply to the center, children and their caregivers participated in an Intake Interview at Time 1 (age: $M = 18.2$ months, $SD = 4.1$; age range = 12–32 months; 94% of the children were younger than 24 months of age). While attending the Center, participants were involved in several research assessments and were followed up over a three- to four-year period. Children were predominantly white (84% white, 8% African-American, and 8% other ethnicity), and the majority came from middle- to high-income, intact families. The sample in this study overlapped substantially with the one used by Sethi *et al.* (2000), but it was not identical, depending on the availability of data on variables specifically relevant to the present study which addressed different issues and examined antecedent variables that were not part of the previous research.

Children were followed up and administered the Self-Imposed Delay of Gratification Procedure (Mischel *et al.*, 1989) approximately three to three and a half years later, when they were at least 4 years of age. Previous research using this delay procedure has been consistently conducted with children no younger than 4 because prior to this age most cannot understand the choices and contingencies presented to them (Mischel *et al.*, 1989). Note that it is also at 4 years of age when more sophisticated self-regulatory competencies start to appear (see Kopp, 1992). In this study, there were 109 children (55 males) who completed the Delay of Gratification Assessment at Time 2 ($M = 58$ months, $SD = 3.98$ months; age range = 48–66 months). This sample did not differ systematically on any of the relevant measures from the larger one that only took part in the Intake Interview Assessment. Because of the variability in the time that elapsed between assessment at Time 1 and at Time 2 ($M = 39.8$ months, $SD = 3.1$), we computed the difference score in months between Time 1 and Time 2 for each participant, and correlated this difference score with all the independent and outcomes measures. No significant correlations were found.

Materials and Procedures

Time 1: Intake Interview at 18 Months

Procedure

The Intake Interview closely resembles the Strange Situation procedure, but was modified as a screening interview for acceptance to the Center (Aber & Baker, 1990). As in the Strange Situation, the Intake Interview consisted of several episodes, three of which were the focus of this study. These three episodes differed in the level of stress that they imposed on the dyad: mother–child free play, mother–child separation, and mother–child reunion, and are described next.

Mother–Child Free-play Episode. Following a 15-minute interview of the mother conducted by the Center Director, in which the parent, the interviewer, and the child sat together in a room filled with toys, the mother and child were left alone in the room together for 5 minutes, and were instructed to ‘play as you would at home.’

Mother–Child Separation Episode. At the beginning of this episode, the Center Director called the mother out of the room. The toddler was left for 2 minutes in the room with a trained undergraduate research assistant, with whom s/he had previously interacted. The research assistant was instructed to remain silent until the child showed signs of distress, at which point she was instructed to say, ‘Mommies always come back,’ and illustrate with an appear/disappear game.

Mother–Child Reunion Episode. Immediately following the separation episode in which the toddler was left for 2 minutes in the room with a trained undergraduate research assistant, the mother came back into the room, and the research assistant left unobtrusively. The mother had previously been instructed to pick up the child, and stay with him/her for 3 minutes.

The entire procedure was videotaped through a one-way mirror. Maternal and child behaviors were coded from the videotaped episodes.

Molar Assessment of Maternal Unresponsivity

The mother’s responsiveness to the toddler’s cues was assessed with an instrument developed by Crittenden (1988), the Child–Adult Relationship Experimental Index (CARE). This instrument was specifically designed to assess different dimensions of maternal responsiveness to the child’s signals and emotional states. These maternal dimensions were: (1) Facial expression (e.g. impassive, inattentive, dull, expressionless), (2) vocal expression (e.g. flat, expressionless), (3) position and body contact (e.g. distant, awkward), (4) expression of affection (e.g. lacking warmth, emotion), (5) pacing of turns (e.g. non-involved, non-contingent), (6) control (e.g. infant control), and (7) choice of activity (e.g. under-stimulating, boring). We selected this instrument because the CARE index of maternal unresponsivity includes multiple dimensions of maternal behaviors along which mothers may differ (e.g. some mothers show unresponsiveness in their facial expression while others may show it in their vocal expression). These dimensions may also vary across situations (e.g. some situations may afford unresponsivity in facial expression more than others). An overall measure of maternal unresponsivity that takes into account such variability along multiple dimensions should yield a more precise assessment of this construct.

Coding. Maternal behaviors were coded in the free-play and the reunion episodes using the CARE index. For each of the maternal dimensions described above, there

was a specific behavior or set of behaviors that represented unresponsivity (e.g. Facial expression: flat and/or incongruous). Each dimension received a score of 0 if the corresponding behaviors for unresponsivity were absent, of 2 if they were present, and of 1 if they were present but shared features with other behaviors not typically characteristic of unresponsivity (e.g. unresponsive facial expression: (2) dull, inattentive or expressionless; (1) pseudo-pleasure combined with boredom; (0) attentive, genuinely interested).

Data Reduction. Scores across the seven dimensions were summed in the free-play ($\alpha = .83$) and the reunion ($\alpha = .77$) episodes to compute molar maternal unresponsivity indices.

Reliability. Six undergraduate coders watched the Intake Interview tape and rated the mothers' behavior on the CARE Index dimensions for each episode with overlap on one of every five participants. The mean percent agreement among the six coders for the overall maternal unresponsivity index was 85% for the maternal unresponsivity scales in both the reunion and the free-play episodes.

Molecular Assessment of Maternal Disengagement

Mothers' and children's behaviors during the intake interview were also assessed using a computer program that allowed an observer to describe in more specific detail the behavior of the mothers and their children by writing simple subject-verb-object 'sentences' from a pre-defined dictionary (see Sethi *et al.*, 2000).

Coding. Mother and child behaviors were coded every 10-second segments. For each 10-second frame, the number of occurrences of the following descriptor subject-verb-object sentences was identified: Mother physically disengages from the child, mother turns away from the child, and mother leaves child. These behaviors were observed only in the mother-child reunion episode. Anita Sethi served as the index coder, coding for all of the data; there were three reliability coders who together coded 74% of the whole sample.

Data Reduction. Maternal disengagement was computed as the sum of occurrences of the subject-verb-object sentences in each 10-second segment. Of particular theoretical interest was the occurrence of maternal disengagement specifically in response to child negative affect. Hence, the frequency of maternal disengagement behaviors during each 10-second segment was calculated in two ways: (1) frequency of instances of mother's disengagement immediately following child's negative affect (*distress-contingent disengagement* from hereon), and (2) frequency of all other instances of mother's disengagement; that is, those not immediately following child's negative affectivity (*non-distress contingent disengagement* from hereon).

Reliability. In accordance with the procedures used by Sethi *et al.* (2000), Pearson correlation coefficients were computed within each subject (mother-child dyad) between the index coder and one of three reliability coders. In this way, we were sensitive to the degree of inter-rater agreement for multiple occurrences of maternal disengagement in each 10-second time frame. In contrast, using the more common Kappa statistic would have required dichotomizing the data for each 10-second time frame.

The mean correlation for maternal disengagement across participants and across coders for 74% of the data was $r = .99$.

Child's Negative Affect

The construct of child's negative affect was also molecularly defined, using the subject-verb-object descriptions, coded in every 10-second segment for each episode of the modified Strange Situation.

Coding. For each 10-second frame, observers noted the occurrences of the following descriptor child negative affective behaviors: Child cries, child is angered by (any object/person), frustrated by, saddened by, made cranky by. Occurrences of negative affect behaviors were assessed during the free-play episode, separation episode, and reunion episode.

Data Reduction. Negative affect was a composite score comprised of the sum of all negative affect behaviors in each 10-second segment. Because a child's behaviors during the reunion episode may be in great part determined by how he/she coped with maternal separation, negative affect in the separation episode and reunion were added.

Reliability. Following the same reliability procedures described above for maternal disengagement, the mean inter-rater agreement across subjects for the construct of negative affect was .93 during the free-play episode, .97 during the reunion episode, and .87 during separation episode.

Time 2: Delay of Gratification Assessment at Age 5

Procedure: Delay of Gratification Paradigm

Approximately two to three and a half years after the intake interview ($M = 40$ months, range = 30–46 months), children were assessed in a standard self-imposed delay of gratification situation (Mischel, Ebbsen & Zeiss, 1972). Children were seated at a table with a desk bell and then asked to choose between a small or large pile of rewards (e.g. M&Ms, pretzels). After establishing a preference for the larger pile, the experimenter indicated that he/she would have to leave the room. The children had the choice to wait until the experimenter came back and obtain the large pile, or ring the bell and stop waiting, but obtain the less preferred small reward instead. They were also told that they could not leave their seats or eat the rewards. The experimenter returned to the room after 15 minutes, or immediately when the child rang the bell, left the seat, or began to eat the rewards. The situation also terminated if the child showed signs of distress. To record attentional control behavior, we unobtrusively videotaped children through a one-way mirror when they were left alone.

Assessment of Attentional Control Strategies During Delay

Coding. Children's foci of attention (i.e. attention to the rewards, to the bell, and to elsewhere in the room while waiting in delay situation) were recorded second-by-second by a coder blind to all other information in the study.

Data Reduction. *Hot Focus* was scored as the proportion of delay time the child spent attending to the rewards or the bell (i.e. any looking or touching directed to the rewards

and the bell). In contrast, *Cool Focus* was scored as the proportion of delay time the child spent actively attending elsewhere (i.e. counting, playing with their hands, singing, talking aloud, etc).

Instances in which children were engaged in self-focused behavior (e.g. twirling hair, banging their feet) while attending to the rewards or to the bell in a non-specific, unfocused manner were coded as self-stimulation. Given that self-stimulation was unrelated to delay times, and because it is unclear whether it is representative of distraction or a hot focus (i.e. attending to rewards and/or to the bell), these behaviors were not included in the analysis of attentional control strategies. Therefore, the hot and cool focus indices were not mutually exclusive.

Reliability. Data from 13 participants were rated by a second coder to establish reliability. The mean percent agreement among the independent coders, based on the second-by-second observation of the total duration of the 13 videotapes, was 88% for both hot and cool focus. To reduce unreliability in the coding, attention deployment data were used only when the total delay time was greater than 5 seconds ($N = 102$).

Assessment of Delay Times

The amount of time children were able to wait before they rang the bell, left their seats, or began to eat the rewards was measured in seconds. Twenty-eight children were able to wait the full 15 minutes.

Table 1 shows the descriptive data for all the predictor and outcome measures described above.

Results

To understand the transactional nature of child and mother behaviors in relation to situational demands, we first examined the cross-sectional relations between toddler's negative affect and maternal unresponsivity, separately by low versus high stress episodes (i.e. free play and reunion). Next, to determine the unique contribution of negative affect and maternal unresponsivity (at Time 1) in predicting self-regulatory competencies in preschool (at Time 2), we used hierarchical multiple regression analyses. Preliminary analyses indicated that younger children were more distressed in the separation and reunion episodes than older ones ($r(100) = -.31, p < .05$), and females attended more to the reward and bell during the delay procedure than males (M females = .14, $SD = .10$, M males = .009, $SD = .009$, $F(1,100) p < .05$). Therefore age and gender were entered in Step 1 as covariates in all the analyses. In analyses examining the unique effect of maternal unresponsivity on preschool self-regulation, toddler's negative affect was entered in Step 2 and maternal unresponsivity in Step 3. In analyses examining the unique effect of child negative affect this order was reversed—maternal unresponsivity was entered in Step 2 and child negative affect in Step 3. Preliminary analyses also indicated that the interaction between maternal responsiveness and child negative affect (entered in Step 4) was not significant and therefore will not be discussed further. To test for the situational demands hypothesis these regression analyses were conducted separately for low and high stress situations (e.g. free play, reunion).

Finally, to test the interactional demands hypothesis, we examined separately the effect of distress-contingent disengagement and of non-distress-contingent

Table 1. Descriptive Statistics for Predictor and Outcome Variables

MEASURES	Assessment Contexts	Units of Measurement	<i>N</i>	<i>M</i> (<i>SD</i>)	RANGE
Time 1 Predictors					
Child Negative Affect in	Low Demand: Free Play	Observed frequency	102	.09 (.08)	.00–.93
	High Demand: Separation/ Reunion	Observed frequency	102	.31 (.45)	.00–1.82
Maternal Responsivity in	Low Demand: Free Play	Sum (0–2 scale)	109	1.33 (2.12)	.00–10.0
	High Demand: Reunion	Sum (0–2 scale)	109	.84 (1.61)	.00–10.0
Maternal Disengagement in Reunion	High Demand: To Distress	Observed frequency	30	.11 (.22)	.00–.67
	Low Demand: To Non-distress	Observed frequency	102	.05 (.04)	.00–.64
Maternal Disengagement in Free-Play	High Demand: To Distress	Observed frequency	12	.05 (.19)	.00–.67
	Low Demand: To Non-distress	Observed frequency	102	.005 (.01)	.00–.11
Time 2 Outcomes					
Delay Time	Self-imposed Delay Task	Seconds	109	462.78 (357.78)	1.00–900.0
Hot Focus	Self-imposed Delay Task	Ratio (0–1 scale)	102	.12 (.09)	.00–.40
Cool Focus	Self-imposed Delay Task	Ratio (0–1 scale)	102	.08 (.11)	.00–.42

disengagement on child's subsequent self-regulatory competencies in preschool. The occurrence of maternal disengagement contingent on child distress during the low stress, free-play episode was too low (see Table 1) for linear regression analyses to yield interpretable results. Albeit also low, the frequency of distress-contingent maternal disengagement in the high stress, reunion episode was more acceptable ($N = 30$); thus the interactional demands hypothesis was tested only for behaviors that occurred in the reunion episode. This subsample of 30 dyads did not differ from the rest of the sample in gender composition or in the self-regulatory, outcome variables. However, this subsample differed from the larger one in the frequency of overall negative affect (subsample $M = .69$, $SD = .54$; rest of sample $M = .15$, $SD = .30$, $F(1,101) = 20.5$, $p < .01$) and the frequency of maternal disengagement (subsample $M = 1.33$, $SD = .88$, rest of sample $M = .86$, $SD = .45$, $F(1,101) = 12.66$, $p < .01$). This subsample was also

younger in age ($M = 16.67$, $SD = 3.23$ months) than the rest of the sample ($M = 18.80$, $SD = 4.28$; $F(1,108) = 6.09$, $p < .01$), partly explaining differences in negative affect between the groups.

Cross-sectional Associations Between Maternal and Child Behaviors at Time 1

Cross-situational Stability in Maternal Unresponsivity and Child Negative Affect

There was a significant association between maternal unresponsivity in the free-play episode, a relatively low demand, low stress-activation context, and maternal unresponsivity in the reunion episode, a relatively high demand, high stress-activation context, $r(100) = .62$, $p < .01$), demonstrating the level of stability in maternal unresponsivity even across contexts varying in situational demands.¹ However, the child's negative affect in the free-play and separation and reunion episodes (separately and combined) were unrelated.

The Relations Between Maternal Unresponsivity, Maternal Disengagement, and Child Negative Affect

Table 2 shows the partial correlations (controlling by age and gender) of maternal unresponsivity and child negative affect, separately in low demand (e.g. free-play) and high demand (e.g. reunion) situations. The findings indicate that children who displayed higher negative affect during free play had mothers who showed significantly higher levels of maternal unresponsivity in both free-play and reunion episodes. Similarly, mothers who showed greater unresponsivity during free play had children who showed higher negative affect in both free-play and reunion episodes. These results

Table 2. Cross-sectional Associations Between Maternal Unresponsivity and Child Negative Affect at Time 1

		Child Negative Affect		Maternal Disengagement	
		High Demand Situations	Low Demand Situations	Distress Contingent	Non-distress Contingent
Maternal unresponsivity	High Demand Situations	.02	.23*	.16	-.04
	Low Demand Situations	.21*	.25*	.02	-.09
Maternal disengagement	Distress Contingent	.16	-.12		
	Non-distress Contingent	.15	.05		

Note: All analyses control for age and gender.
* $p < .05$.

indicate that if either mother or child displayed characteristic negative behaviors (i.e. unresponsivity, negative affect, respectively) in a relatively low stress-activation context, the other partner in the dyad displayed their own characteristic negative behavior across situations. There were no significant associations between maternal disengagement and maternal unresponsivity, or between maternal disengagement and child's negative affect, in either low or high demand situational or interactional contexts.²

Prospective Associations Between Time 1 Predictors and Time 2 Outcomes

Predicting Self-regulatory Competencies: Maternal Unresponsivity and Child Negative Affect as a Function of Situational Demands

With respect to the prospective associations, Table 3 shows the effect of child negative affect and maternal unresponsivity at Time 1 in predicting hot focus during delay at Time 2. Both child negative affect and maternal unresponsivity assessed in the high stress situation were significant predictors of later use of ineffective attentional strategies, or hot focus (for cool focus and delay times, all $ts < 1.0$). Specifically, maternal unresponsivity in the high stress situation (i.e. mother-child reunion) significantly predicted hot focus during preschool delay when controlling for the effects of age, gender, and negative affect (*Total R square* = .22, $F(4,94) = 6.1, p < .01$). Child negative affect in high stress situations (i.e. maternal separation and mother-child reunion together) was also predictive of hot strategies during delay in preschool when controlling for age, gender, and maternal unresponsivity. There were no significant effects of maternal unresponsivity or child negative affect on any of the self-regulation indices when these predictors were assessed in the low stress situation (e.g. free play). Thus, consistent with expectations, maternal unresponsivity and child's negative affect was related to children's subsequent use of ineffective attentional self-regulatory strategies *if* these behaviors were displayed in situations that were presumably emotionally demanding for the dyad.

Table 3. Predicting Hot Focus During Preschool Delay at Time 2 from Maternal Unresponsivity and Child Negative Affect at Time 1

Step	Predictor Variables	High Stress Situation		Low Stress Situation	
		β	ΔR^2	β	ΔR^2
1	Age	.07		.05	
	Gender	.18	.04	.20	.04
2	Child Negative Affect	.20*	.04	.19	.04
3	Maternal Unresponsivity	.37**	.14**	.10	.01

Note: The regression coefficients presented for each variable are those obtained in the last step. ** $p < .001$.

Table 4. Predicting Hot Focus During Preschool Delay Time 2 from Maternal Disengagement at Time 1

Step	Predictor Variables	Distress Contingent		Non-distress Contingent	
		β	ΔR^2	β	ΔR^2
1	Age	-.07		.09	
	Gender	.13	.08	.18	.04
2	Maternal Disengagement	.58**	.26**	-.05	.004

Note: The regression coefficients presented for each variable are those obtained in the last step.
** $p < .01$.

Predicting Self-regulatory Competencies: Maternal Disengagement as a Function of Interactional Demands

Table 4 shows the prospective associations between maternal disengagement contingent to child's distress and to non-distress behaviors and hot focus during delay. As expected, maternal disengagement behaviors contingent to toddlers' negative affect in the mother-child reunion situation significantly predicted hot focus in the preschool delay of gratification situation, controlling for the effects of age and gender (*Total R square* = .25, $F(3,26) = 3.9$, $p < .05$). Thus, toddlers whose mothers disengaged from them when they showed distress in a mother-child reunion episode were significantly more tempted by the rewards while waiting in the delay situation at age 4. To examine the contribution of conditional maternal disengagement above and beyond the unconditional maternal disengagement and child negative affect, a second analysis included these variables as additional covariates. Conditional maternal disengagement (i.e. distress contingent maternal disengagement) continued to significantly predict subsequent use of ineffective 'hot focus' strategies during delay (*R square change* = .23, F change (1,21) = 9.5, $p < .01$).

In contrast to the diagnosticity of maternal disengagement contingent on child distress, maternal disengaging behaviors *not* following their toddler's display of negative affect were not related to hot focus during preschool delay at Time 2. Similar to the effects of maternal unresponsivity, maternal disengagement behaviors to toddlers' negative affect was predictive of 'hot,' ineffective temptation strategies, but were not significantly associated with cool focus or with delay time.

Discussion

Overall, the results of the study supported the hypotheses concerning the contextualized role of maternal unresponsivity and toddlers' distress proneness as early antecedents of preschool children's self-regulatory abilities. The competency-demand hypothesis predicts that stressful or highly demanding situations are especially diagnostic of individual differences and coping styles (e.g. Shoda *et al.*, 1993, 1994; Wright & Mischel, 1987). Consistent with this prediction, analyses of *situational demands* indicated that molar ratings of maternal unresponsivity to the toddler when

these maternal behaviors were displayed immediately after separation—a situation that puts high demands on the child's self-regulatory skills and in which maternal support for emotion regulation was most crucial—significantly predicted ineffective attentional strategies (e.g. temptation, or 'hot focus') during the preschool delay of gratification task. In contrast, as expected, maternal unresponsivity to the toddler during free play (a low demand situation for the child's self-regulatory skills) did not predict subsequent attentional control difficulties.

Consistent with this pattern, molecular analyses of *interactional demands* provided further support for the competency–demand hypothesis. Maternal disengagement behaviors contingent on the child's negative affect during reunion were significantly related to children's subsequent inability to use effective attentional control strategies later in preschool. However, maternal disengagement to other non-distress child behaviors was unrelated to children's attentional strategies in preschool. Thus, at an interactional demand level, maternal disengagement was negatively related to the child's development of self-regulatory skills only if they occurred in temporal contingency to the child's expressions of negative affect and distress.

Together, these results are also consistent with attachment theory which postulates that children would come to expect their caregivers' availability when they feel distressed if in the past their caregivers have been responsive to their cues of negative affect (Ainsworth, Blehar, Waters & Wall, 1978; Bowlby, 1969/1982; Bretherton, 1985). The negotiation of stressful situations in daily life would be particularly critical for the formation of these expectations (Sadeh & Anders, 1993), and for the development of social and emotional competencies that rely on attachment security. The qualities and contexts that characterize stress and responsiveness and that are likely to affect self-regulatory development may also change over time as the needs of the developing child are transformed. For example, while timely maternal responsiveness to separation may be a diagnostic *if–then* situation–behavior contingency in infancy and toddlerhood, it may be replaced by other age-appropriate *if–then* behavioral signatures (Mischel & Shoda, 1995) in middle childhood and adolescence (e.g. *if* the child has difficulties at school—*then* parental involvement, or lack of it, in daily homework is crucial). Understanding how contextual and interactional demands challenge the child's self-regulatory competencies at different points in development is thus key for the conceptualization and assessment of maternal behaviors.

The present results also underscore the adaptiveness of discriminative facility (Chiu, Hong, Mischel & Shoda, 1995; Cheng, 2003) on the part of the mother; that is, her flexibility in being able to adjust her behavior in response to the specific demands of a given situation. Such discriminative facility can be conceptualized as an index of mother's own self-regulation or social-emotional intelligence (Cantor & Kihlstrom, 1987), and has been associated (both correlationally and causally) with more positive social, interpersonal, and emotional outcomes (Chiu *et al.*, 1995; Cheng, 2003; Cheng, Chiu, Hong & Cheung, 2001).

It is noteworthy that we found no associations between the measures of maternal unresponsivity and the measures of maternal disengagement. Theoretically, one would expect distress-contingent disengagement to be correlated with maternal unresponsivity during mother–child reunion because both capture some aspect of mother's lack of sensitivity and responsiveness under conditions of high stress. This lack of correspondence could be due, first, to the different level at which these behaviors were assessed. Maternal unresponsivity was assessed at a relatively molar level, (i.e. an observer would categorize maternal behaviors after watching them through an entire

episode) while maternal disengagement was assessed at a molecular level. Lack of correspondence between molar and molecular observational judgments is not uncommon (e.g. Seifer, Sameroff, Barrett & Krafchuk, 1994). Second, the lack of association may be due to the fact that maternal disengagement to child distress is a dyadic assessment (i.e. frequency of maternal behaviors conditional on child's behavior) as opposed to an assessment of the frequency of child or mother's behaviors, separately. Finally, the molar ratings of maternal unresponsivity and the molecular observations of maternal disengagement may tap into different constructs, or into different components of a more general construct of maternal unresponsivity (e.g. maternal unresponsivity may reflect more affective qualities of maternal lack of responsiveness whereas maternal disengagement may be purely reflecting the actions themselves).

Mechanisms Underlying the Prospective Associations of Maternal Unresponsivity and Disengagement and Subsequent Self-regulatory Difficulties

Although our findings indicate that maternal unresponsivity in certain diagnostic situations is related to children's continuing self-regulatory difficulties into the preschool years (see also Sethi *et al.*, 2000), we can only speculate about the possible mechanisms that underlie these links. It is likely that a toddler in distress would escalate the amount of his/her protests and negative affect to gain mother's attention, particularly in high stress situations in which the mother is unresponsive or physically disengages. In fact, experimental research has shown that toddlers become unfocused and display more negative bids for interaction when their mothers simulate (i.e. pretend in the experiment) withdrawal and enact expressions of depressed affect (Seiner & Gelfand, 1995). A combination of increased arousal and negative affectivity, with a concomitant reduction in the child's available cognitive and attentional resources, would negatively impact on the development of self-regulatory skills, especially those involving attentional control (e.g. Cohn & Tronick, 1988; Kochanska, Murray & Harlan, 2000; Tronick, 1989). Consistent with these findings, it has been found that infants with more responsive parents were better able to regulate their distress in a reunion situation following a still face (high stress situation) showing a rebound in social attention, and decreasing negative affect and heart rate (Haley & Stansbury, 2003). Consequently, children with such a history may become more stimulus-driven, less able to appropriately shift attentional focus, and less resourceful in their use of distracting strategies. Such maladaptive coping, in turn, may perpetuate self-regulatory difficulties due to their reduced experiences of success in goal attainment.

The Effect of Maternal and Child Characteristics on Cool Focus and Delay Time

Maternal unresponsivity to toddlers' distress as well as toddlers' negative affect were predictive of preschoolers' tendency to use hot attentional focus but not of their ability to use cooling, distracting strategies in the delay situation. Similarly, maternal behaviors and child negative affect in toddlerhood were only marginally related to actual delay times in preschool. Based on previous findings of preschoolers' attentional strategies during delay (e.g. Peake *et al.*, 2002), we had reasons to expect that the early mother-child interaction variables would be related to diverse self-regulatory components, including cool focus and delay time. However, it is possible that the specific associations found between the early maternal and child variables (e.g. maternal unresponsivity in stressful contexts, child's distress, and dysregulated affect) and the

subsequent self-regulatory difficulties (e.g. hot focus) during delay in preschool, were due to the similarity of the early and later constructs, both referring to impulsive, stimulus-driven, unmediated responses.

Furthermore, the weak relation found between the early assessments and delay time may be due to the fact that while children's hot focus on the rewards may have diminished some of the children's waiting times, it may not have totally undermined other children's abilities to use effective distracting strategies in the delay situation. Indeed, post-hoc analyses indicated that a combination of high levels of hot attentional focus with low levels of cool focus (i.e. children who were predominantly tempted by the rewards, looking at them and touching them, without use of any distraction strategies) was, in particular, detrimental to children's ability to wait in the delay situation. Those children who used high levels of *both* hot and cool strategies, and those who avoided using hot strategies in general (regardless of whether or not they used cool focus) were similar to each other and were able to delay longer than the high hot focus—low cool focus group, $F(3,92) = 5.3, p < .01$.

Patterns of Continuity in Attentional Control

As part of the larger longitudinal study a subsample of these children ($N = 52$) were administered a symbolic play task (an adaptation of Belsky & Most, 1981) at age 24 months, yielding data on children's ability to focus attention during play at age 2. These data gave us the opportunity to explore the replicability of the findings found for hot attentional focus in preschool with a conceptually similar construct at age 2. It also allowed us to assess temporal continuity in attentional control from 2 to 4.5 years of age.

The symbolic play task is designed to assess the toddler's level of symbolic play ranging from undifferentiated exploration (e.g. mouthing, simple manipulation) to elaborate forms of pretend play. Unfocused symbolic play was the child's less elaborate form of play, and was rated as such by the observers when the child was not engaged in any visually guided exploration. In these analyses we found that this maternal unresponsivity and toddler's negative affect in mother-child reunion, but not in mother-child freeplay, were associated to two-year olds' inability to focus during the symbolic play task ($r = .45, p < .001$). At the interactional level, we found that maternal disengagement contingent to toddlers' negative affect was also associated with children's inability to remain focused in a symbolic play task at 2 years of age ($r = .52, p < .05$) while maternal disengagement contingent to non-distress behaviors was not. Thus, it seems that there is a pattern of temporal continuity in how maternal unresponsivity in normatively high stress situations or in contexts where the child directly expresses distress affects the development of a child's ability to deploy attention effectively.

Caveats and Conclusions

Several constraints and caveats need to be considered when interpreting the findings. First, the study extends previous findings from low-income and/or clinical samples to moderate to high-income, non-clinical samples, but their generalizability is constrained to samples low in demographic and clinical risk. Thus, future research is needed to more fully determine the contextual effects of maternal unresponsivity, disengagement, and under-involvement, in populations at high risk for maternal depression or heightened life stress.

Second, the temporary and contextual nature of the child's negative emotionality data obtained from molecular observations of mother-child interactions may only in part be reflective of an enduring disposition in proneness to distress. Other more direct measures of temperament, such as parental reports of a child's temperamental qualities, may have strengthened the results regarding the child's contribution in continuities of self-regulatory deficits.

Third, our findings in support of the interactional demands hypothesis should be interpreted cautiously because of the low occurrence of child distress-contingent maternal disengagement. Only a subset of the mother-child dyads showed this interaction pattern and the majority of these instances occurred in the high stress, reunion episode. Somewhat unsurprisingly, these mother-child dyads were also the ones in which there was a higher frequency of unconditional maternal disengagement behaviors. We therefore controlled for the effects of overall maternal disengagement in our analysis and found that the effect of conditional maternal disengagement (that is, contingent on a child's expression of distress) continued to predict the child's regulatory difficulties in the preschool delay of gratification task. Nevertheless, the generalizability of this finding to dyads that are low in overall maternal disengagement and child negative affect cannot be assumed.

These caveats notwithstanding, the study provides new evidence that maternal unresponsivity and disengagement in specific, critical, 'diagnostic' situations, namely those that are highly demanding of the child's self-regulatory skills, are predictive of subsequent self-regulatory competencies in a non-clinical sample, consistent with the competency-demand hypothesis (Shoda *et al.*, 1990; Wright & Mischel, 1987). Because children with early self-regulatory difficulties may be at greater risk for social maladjustment and school failure later in life (Mischel *et al.*, 1989), these findings ultimately may be useful for the delineation of therapeutic interventions designed to foster self-regulatory competencies at early stages in development. Overall, the findings support the heuristic value and predictive utility of a theory-based contextual analysis of mother-child interactions in the development of self-regulation.

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Notes

1. Given the skewness in the distribution of the scores of maternal unresponsivity and child's negative affect (see Table 1), all the analyses involving maternal unresponsivity were repeated using discrete 0–1 categorical scores in each of these two variables. Because the pattern of results obtained remained largely unchanged, we report those obtained using the continuous scores.

2. To control for the possible effect of cross-situational stability of negative affect in the concurrent associations between maternal unresponsivity and child negative affect by situational demands (presented in Table 2), for each of these associations we partialled out the effect of child negative affect in the other context (e.g. in the association between maternal unresponsivity in high demand situations with child negative affect in the high demand situation, we controlled for negative affect in the low demand situation). The results of these semi-partials were very similar to those presented in Table 2, indicating that the associations obtained are not the result of simple continuities in child negative affect.