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Parental Reflective Functioning, Emotion Regulation, and
Stress Tolerance: A Preliminary Investigation

Ben Goldberg

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Class of 2011

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Abstract

While strong and interdependent associations between reflective functioning, emotion regulation, and stress tolerance have been theorized in the attachment security and psychoanalytic literature, this is one of the initial reports of the investigation of such associations. Twenty-six mothers of young children were administered a novel self-report measure of parental reflective functioning, two distinct stress induction tasks, and three self-report measures of emotion regulation. It was predicted that greater maternal reflective functioning, as measured by the PRFQ-1 self-report measure, would predict greater stress tolerance, as measured by persistence times in the Simulated Baby Paradigm and PASAT-C, as well as greater ability for emotion regulation, as measured by the DERS, ERQ, and BRIEF-A self-report measures. It was also hypothesized that greater emotion regulation would predict greater stress tolerance. Initial correlations generally did not support these hypotheses. However, further analysis of the data suggested that maternal reflective functioning may mediate the relationship between the self-appraisal of one's capacity for emotion regulation and behavior in a stressful, parenting-specific task. These findings suggest a complex and interdependent relationship between parental reflective, emotion regulation, and stress tolerance.

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Introduction

According to attachment theory, the uniquely strong attachment relationship between a primary caregiver and an infant has evolved to protect the health and safety of the infant by encouraging physical proximity by both the caregiver and the infant to one another, especially in times of danger. In addition to this vital protective function, attachment theory posits that the attachment relationship serves further as a powerful mediator of the infant's psychosocial, and even neurological, development over time (1). Furthermore, as Bowlby's work suggested, qualities of the attachment relationship such as attachment security tend even to be perpetuated in families across generations (2). Given the centrality of attachment relationships to human development, their core qualities and complexities have been the subjects of intense scrutiny and research over the past 50 years.

Current theory and research suggests that among the many aspects of the child's development thought to be influenced by the attachment relationship are the sense of self, the ability to tolerate stress, and the ability to regulate one's emotions, each of which has been shown to have implications for psychopathology (3-5). In fact, secure attachment has been described as synonymous with successful emotion and stress regulation (1).

Research suggests that a core mediator of attachment security, and thus, of emotional regulation and stress tolerance, is the caregiver's capacity for *mentalization*, a term which was coined in 1991 by Peter Fonagy (6), and which derives from the concept of *theory of mind*.

Mentalization has been described as:

the imaginative activity by means of which we perceive and interpret human behavior in terms of intentional mental states such as needs, desires, feelings, beliefs, goals, purposes, and reasons (7).

While a significant theoretical foundation has suggested the vital role of mentalization capacity in the successful development of emotion regulation and stress tolerance, the empirical study of the relationships between them remains in its infancy (2). The primary aim of this thesis is to explore the relationships between mentalization, emotion regulation, and stress tolerance, using both novel and established measures, in a sample of the mothers of young children.

Attachment as Mediator of Emotional Regulation and Stress Tolerance

Fundamentally, the strong mutual bond between a caregiver and an infant, better known as the attachment relationship, serves, among its core functions, the function of emotion regulation (1,8). Simultaneous with the drive for proximity and physical safety felt by a distressed infant is the often-intense desire for the containment of the negative emotions created by the distress. As described by Bowlby, Ainsworth, and many others, individual differences in the caregiver's availability and responsiveness to an infant's distress exert a powerful effect on the infant's attachment security to the caregiver. Furthermore, an individual's cumulative experience of the reliability and sensitivity of caregivers shapes his or her strategies for coping with stress and negative emotion, resulting in relatively stable variations on secure or insecure attachment (9,10).

Securely-attached infants, as assessed in the Strange Situation task at approximately 12-18 months of age, are observed to use their mothers as a safe base from which to explore and play. The Strange Situation, developed by Mary Ainsworth and colleagues, is a standardized 20-minute laboratory simulation of brief parent-infant separations and reunions (11). When faced with separation from their mothers during the task, secure infants demonstrate varying degrees of distress, but can be soothed quickly upon their return, whether by physical contact or other forms of communication. In sub-optimal circumstances, however, where caregivers have been inconsistently available, neglectful, or even abusive, secondary attachment strategies develop in the child, in order to simultaneously manage distress and maintain attachment with the caregiver. These strategies, grossly categorized as the avoidant, ambivalent, and disorganized insecure attachment styles, are generally measurable as early as the end of the first year of life, and are seen in infant populations throughout the world (12).

Avoidant infants tend to express less interest in their mothers during play than secure infants, are less visibly distressed during separation, and tend to ignore their mothers upon reunion.

Ambivalent infants, on the other hand, have difficulty separating from their mothers to engage in play, are hyper-vigilant to her presence during play, tend to either become highly distressed or simply inhibited during separation, and are observed to greet their mothers more positively than other infants upon their return. Infants classified as disorganized, however, seem to lack a coherent strategy to cope with separation from their mothers. Many of these disorganized infants display elements of both avoidant and ambivalent attachment styles, while others display bizarre behaviors that are not consistent with either category. As research has shown,

these secondary attachment strategies may even persist into adolescence and even adulthood, though they are not considered immutable (13).

While each of these variations of insecure attachment characterize an individual's style of coping with brief separation from their caregiver, according to Mikulincer and Shaver (13), they also characterize distinct strategies of emotion regulation that infants, children, and even adults regularly employ to manage distress and negative emotion in a range of contexts, including interactions of parents with their own children. A small pilot study by Haft and Slade (14), examined qualitatively how parents of young children responded to their children's emotional states. They found that parents who had been classified as having avoidant or dismissing attachment styles were more likely to respond to their children's requests for comfort and reassurance with rejection, while appearing most comfortable with their infants' expressions of exuberance and autonomy.

The two best-studied secondary attachment strategies are the deactivating and hyperactivating strategies. Deactivation, which is strongly associated with an avoidant attachment style, is thought to derive from experiences in which emotionally unavailable, cold, or even hostile caregivers have responded to the infant's distress or attention-seeking behavior by withdrawing, rejecting, or becoming angry. In many ways, deactivation resembles a strategy of inhibiting or avoiding attachment itself, though it has not been shown to decrease the subjective or physiological experience of stress (10). As seen in avoidant infants, the stress of separation from a caregiver is less likely to be expressed and the need for consolation

dismissed. As a result, avoidant infants and young children are often seen as precociously independent or self-reliant.

In contrast, hyperactivation, which is strongly associated with ambivalent or anxious attachment styles, derives from experiences with caregivers who are experienced as unreliably attentive, preoccupied, or anxious. Unlike the caregivers of avoidant infants, however, these caregivers are capable of being attentive and soothing some of the time. In order to successfully capture their caregivers' attention, though, these infants must up-regulate their attention seeking behaviors, such as crying or clinging, to the point of demanding a response (13). Over time, these behaviors are rewarded frequently enough to encourage an insecure, hyperactivating strategy in response to distress and negative emotion.

On the other hand, a secure attachment relationship characterized by a predominantly supportive, sensitive, and attentive caregiver creates, for an infant, the belief that his or her distress and negative emotions will be consistently neutralized or contained by the caregiver. Such caregiving enables the secure infant to internalize, over time, a sense of safety in the face of distress, leading ultimately to enhanced distress tolerance, coping skills, and a confidence in the exploration of new situations and relationships beyond the abilities of most avoidant and ambivalent infants.

In a not-yet-published review of attachment and stress regulation, Luyten et al (1), present strong and multidisciplinary evidence from cognitive neuroscience, attachment theory, and endocrinology for a biobehavioral model linking attachment security, emotion regulation, and stress tolerance. The authors conclude that broad evidence supports the view that emotion

regulation and distress tolerance develop through interpersonal co-regulation in the context of early attachment relationships, modulated by epigenetics, neuroplasticity and alterations to the hypothalamic-pituitary-adrenal hormonal system. The authors also suggest a strong mediating role for parental mentalization in the attachment relationship.

Mentalization as Mediator of Attachment Security

Mentalization has been described as the mental capacity that enables us to perceive and interpret human behavior in terms of underlying mental states and intentions (7,8). It is a fundamentally interpersonal capability that is developed and expressed primarily in the context of attachment relationships.

Mentalization is best understood as representing a multi-dimensional set of abilities, such as the ability to express mental states consciously or verbally, the ability to infer mental processes from another's thoughts or feelings by way of visible features such as facial expressions, the ability to mentalize about one's self versus about others, and the ability to empathize with others. Each of these abilities is thought to depend on the development of unique neural and cognitive mechanisms (15). Accordingly, an individual may have deficits in some or, occasionally, all of these abilities.

Mentalization is also thought to be relationship-specific and context-specific, as opposed to representing a static personality trait (15). As such, one's mentalizing abilities may differ in real-time depending on both the interpersonal context, ie. the nature of the relationship with the

person one is relating to, as well as real-time levels of alertness versus fatigue and stress and arousal. Of particular interest to this thesis is parental mentalizing capacity, the specific form of mentalization unique to the relationship between a parent and his or her infant. It is this specific form of mentalizing ability that is thought to play a central role in the establishment and inheritance of secure attachment from one generation to the next (8). The concept of parental mentalization shares many features with the concepts of metacognitive monitoring (16), emotional understanding (17), and mind-mindedness (18).

Furthermore, research has demonstrated that stress and arousal have powerful effects on mentalizing capacity and the activation or inhibition of brain regions associated with various aspects of mentalization (15). In fact, it has been suggested that differences in mentalization between securely and insecurely-attached individuals may be most profound under increased levels of stress (15).

The concept of mentalization developed from groundbreaking research into the core determinants of secure attachment between mothers and their infants in the 1980s and 1990s, at the intersection of developmental psychology and psychoanalytic theory (7). Pioneering work by Main and colleagues beginning in 1985 (9,16) had shifted the study of the determinants of secure attachment from behavioral studies of caregiver-infant interactions, such as maternal affection and sensitivity, to the study of how caregivers represented their thoughts and feelings about their own attachment relationships in language. Main and colleagues were able to begin to assess these attachment representations through the use of the Adult Attachment Interview (AAI) (19), which asked parents about their childhood and relationships with parents as well as

how they felt past events and relationships have affected them as adults. Questions include “Why do you think your parents behaved the way they did?” and “What kind of effect did your childhood experiences have upon your development and personality?” The authors found a significant relationship between parents’ own attachment security, measured from their responses to the AAI, and their child’s security of attachment to them measured 5 years prior in the Strange Situation task, providing powerful supporting evidence for the intergenerational transmission of attachment security. Just as importantly, though, the authors found that mother’s responses to the AAI varied considerably in their coherence, with insecurely attached mothers often providing contradictory statements about the same attachment figure while seemingly lacking the ability to reconcile these contradictions. On the other hand, securely attached mothers were more likely to avoid such contradictory statements and were able to achieve more coherent and plausible perspectives about their relationships with parents (16). Main attributed these findings to differences in how individuals were able to mentally represent, reconstruct, and organize their thoughts and feelings about their attachment figures. She referred to this ability as *metacognition* – the “flexibility and readiness for examination” and contemplation of one’s own mental processes (16). With limited metacognition, an individual faced with the complexities and contradictions inherent in almost any relationship with a caregiver would be less able to re-evaluate and reconcile contradictory aspects of that relationship, leading to a representation of that caregiver that is marked by disorganization and incoherence. Main further proposed that this disorganization and incoherence would pervade a mother’s relationship with her own infant, leading to the infant’s development of defensive mechanisms and strategies. These strategies, later validated by research as noted in the above

section, are adaptive in some ways, but would ultimately serve to limit the mental flexibility necessary for fully-developed metacognitive capacities and would be associated with insecure attachment.

At around the same time, Fonagy and colleagues in the London Parent-Child Project (20), were seeking to replicate Main's findings and to further investigate the representational aspects of attachment. The authors found that a mother's way of describing her own upbringing and her relationships with her parents on the AAI, assessed prior to giving birth, was a significant predictor of the quality of attachment to her at 1 year of age – better even than the quality of the mother's upbringing itself. Like Main and colleagues, the authors found several distinctions between the AAI narratives of mothers of secure infants versus insecure infants. For example, the mothers of insecure children tended to be dismissive or idealistic about their upbringings and relationships with their parents, or even fail to conjure any important memories of their childhoods. On the other hand, mothers who demonstrated a balanced understanding of the complexities of their own development and parental relationships had children who were significantly more likely to be securely attached to them. Additionally, they also replicated the finding that the mothers of secure infants were capable of expressing more coherent responses than the insecure mothers. Each of these findings suggested that a mother's capacity to mentally organize and represent her own relationships with her caregivers was the most important mediator of attachment security, even when controlling for variables such as socioeconomic status, verbal ability and mental illness.

To account for these findings, Fonagy and colleagues (21) developed the concept of reflective self functioning, which was replaced soon thereafter by *mentalization*. They defined the reflective self as the “internal observer of mental life... which knows that the self feels, perceives, [and] reacts,” and suggested that this mentalizing capacity enables one to better understand the links between one’s underlying mental states and one’s actions. This capacity for intuitively understanding the connection between mental states and behavior, or the lack of such capacity, they found, explained much of the difference between the AAI narratives of mothers of secure infants versus insecure infants in the London Parent-Child Project, and thus was likely to be a core mediator of attachment security. In fact, the authors found that the most powerful predictor of infant security in that study – narrative coherence – lost its independent predictive value when mentalization was controlled for. The authors posited that mentalization allows the caregiver to anticipate and acknowledge the infant’s mental states, including affective states, accurately and in real time. This, they suggested, was the basis of secure attachment. The authors concluded that:

A child may be said to be secure in relation to a caregiver to the extent that, on the basis of his or her experience, he or she can make an assumption that his or her mental state will be appropriately reflected on and responded to accurately (21).

In contrast, the lack of capacity for mentalization might impede a caregiver from providing the necessary care for the infant’s full mental development. Insecurity, as seen in avoidant or ambivalently attached children, may represent psychic defenses that the infant employs in the setting of an attachment relationship in which the caregiver, for various reasons, is less capable

of considering and acting upon the infant's mental states and affective signals (22). As stated by Fonagy:

Insecure attachment is a defensive compromise, in which either intimacy or autonomy appear to be sacrificed for the sake of retaining physical proximity to the caregiver incapable of containing the infant's affect (23).

As to the development of mentalizing capacity in the infant, which will be discussed in more detail below, Fonagy hypothesized that "accurate conscious reflection presupposes the experience of having been the subject of such confident reflection" (24). The process, he claimed, was "intersubjective," with the caregiver's understanding and "containment" of the infant's mental states being necessary for the child to come to develop the capacity to know not only his or her own mind but the caregiver's mind as well (25). Secure attachment thus represents the presence of a secure base for the infant to explore not only the physical world, but mental worlds as well. The absence or limitation of this mentalizing capacity in the caregiver, on the other hand, would limit the development of that capacity in the infant, increasingly the likelihood of an insecure attachment relationship.

As such, the capacity for mentalization might account for the intergenerational concordance of attachment patterns, previously suggested by Bowlby and frequently observed since in the attachment research, wherein secure caregivers raise securely-attached infants and insecure caregivers raise insecurely-attached infants. This conclusion was strongly supported by a 1995 meta-analysis by van IJzendoorn (26) of the predictive validity of the AAI determining infant attachment security. Van IJzendoorn found that across 18 studies, parental AAI classification

predicted infant attachment security or insecurity approximately 75% of the time with an effect size of 1.06 (n=854 dyads). As a result, the attention of researchers began to focus more clearly on the processes by which mentalization, which became known as *reflective functioning* in the specific context of attachment (27), shapes attachment and lays the foundation for the infant's capacities for emotional regulation, stress tolerance, and other developmental outcomes.

Mentalization and the Development of Emotion Regulation and Stress Tolerance

As discussed above, mentalization is the capacity for understanding one's own and others' behavior in terms of underlying mental states. In the context of attachment, mentalization or reflective functioning includes an emotional component as well – the capacity to contain and regulate one's own and others' emotional experiences. Numerous studies cited in the above sections demonstrated the importance of parental mentalization or reflective functioning in the intergenerational development of attachment security as well as the importance of attachment security for the development of mentalization and successful strategies for emotional regulation and stress tolerance. According to Fonagy and colleagues, these outcomes are fundamentally related. Over the past few decades, researchers such as Fonagy and colleagues have attempted to elucidate the links between parental reflective functioning and an infant's capacity for mentalization, emotional regulation, and stress regulation, which they refer to as the social-biofeedback model (3), in which mentalization and emotion regulation develop in the infant as a product of certain characteristic aspects of the attachment relationship.

Simply put, according to this model, “the securely attached child perceives in the caregiver's reflective stance an image of himself as desiring and believing” (3). Parents or other caregivers

play a crucial role in reflecting back to the infant the representation of the infant as an “intentional being” with his or her own mental states, such as thoughts, feelings, beliefs, desires, and needs. According to the authors, the development of mentalization occurs gradually throughout infancy and into childhood, achieved mainly through parental “affective mirroring,” the mirroring of the infant’s mental states through exaggerated facial and vocal expressions, and through pretend play:

The child’s mental state must be represented sufficiently clearly and accurately for the child to recognize it, yet sufficiently playfully for the child not to be overwhelmed by its realness. In this way, he can ultimately use the parent’s representation of his internal reality as the seed for his own symbolic thought (3).

The development of mentalization ultimately enables one to “fathom the meaning of one’s own affect states... while remaining within [them],” (3) a capacity central for one’s ability to act upon one’s own emotions and thus to regulate them. Thus, emotional and stress regulation are initially achieved by parental-infant co-regulation; only later on does the infant internalize these capacities sufficiently enough to achieve them alone.

To be effective, though, these parental tasks require caregivers to be reflective themselves, capable of attuning to the mental states underlying the infant’s limited range of behaviors. As such, the development of mentalization is vulnerable to limited reflective capacities in the caregiver or attachment-related traumas such as abandonment, neglect, abuse, or parental mental illness. Thus, mentalization and reflective functioning, and by extension emotion regulation and stress regulation, can be thought of as “transgenerational acquisitions” in many cases. According to Fonagy and colleagues, “we think of others in terms of desires and beliefs because—and to the extent that—we were thought of as intentional beings” (3).

Measuring Mentalization and Reflective Functioning

The assessment of one's capacity for mentalization or reflective functioning has evolved along with attachment theory. Prior to the development of the AAI, which was developed to classify adults according to their security of attachment, attachment investigators attempting to pinpoint the determinants of secure or insecure infant attachment relied mostly on observable behavioral measures, such as facial affective expressions and eye contact. With the development of the AAI and Main and colleagues' subsequent description of the importance of metacognition for attachment, however, the study of the determinants of attachment security shifted from the observable and behavioral to the representational and verbal. As mentioned above, analysis of the coherence of a caregiver's narrative in response to the AAI was the first attempt to capture the metacognitive, mentalistic, and reflective qualities of how subjects represented the connections between their own and others' mental states, relationships, and actions, and paved the way for further efforts to capture and measure mentalization.

From this foundation, Fonagy and colleagues began to look for ways to analyze mentalization and reflective functioning more directly, with the goal of classifying subjects reliably into broad categories from low to high reflective functioning. They developed an early version of the reflective functioning scale for use with the AAI, with which to rate the mentalistic qualities of caregivers' individual statements and their narratives as a whole (25). The scale was used to score individual statements from "1" to "5", with "1" corresponding to lower reflective functioning. For example, a score of "1" on the reflective functioning scale corresponded with

the expressed acknowledgement of mental states in self and others. A score of “3” corresponded to the recognition of the complexity and diversity of mental states, including the often contradictory nature of mental states. Lastly, a score of “5” corresponded to the appreciation that changes in mental states had implications for similar changes in behavior. When initially applied to the parents in the London Parent-Child Project (20), Fonagy and colleagues found a high level of variation in parents’ reflective functioning. At the lower end, many parents demonstrated very little understanding of the mental states underlying their own parents’ behaviors. As a result, their answers to questions about their childhood relationships to their parents had a “shallow and unintegrated sense of how emotions are indeed dynamic aspects of experience and relationships” (8). In their descriptions of their own parents, these individuals were able only to describe their behaviors and personalities, without an expressed understanding of the importance of underlying mental states. According to Slade, responses low in reflective functioning would often correspond clinically with high levels of psychological defenses. At the higher end, many parents did demonstrate the capacity to connect their parents’ mental states with their behaviors and were better able to separate their parents’ mental states from their own.

As mentioned above, the reflective functioning scores correlated well with narrative coherence and attachment security and even predicted infant attachment security at 1 year of age. This reflective functioning scale for the AAI was later expanded and manualized by Fonagy and colleagues. (28) The expanded reflective functioning scale is a continuous scale, rather than the previous ordinal scale, ranging from “-1” (signifying a bizarre response) to “9” (signifying high

reflective functioning). Scoring is determined on the basis of 1) awareness of the nature of mental states, 2) explicit effort to investigate mental states underlying behaviors, 3) recognition of the developmental context of mental states, and 4) recognition of mental states in the context of the interviewer (8). This method for understanding and assessing reflective functioning became the basis for significant further research into reflective functioning, the development of affect regulation, the development of the self, and psychopathologies such as borderline personality disorder (3,29).

Aber and colleagues developed a measure similar to the AAI called the Parent Development Interview (PDI), a 45-item semi-structured interview, to be administered to the parents of infants and young children. The PDI includes questions such as: "Describe a time when you and your child really clicked," and "Describe a time when you and your child really didn't click." According to Slade, questions such as these "tap into parents understanding of their child's behavior, thoughts, and feelings, and ask the parents to provide real life examples of charged interpersonal moments" (8). In contrast to the AAI, which asks parents to examine relationships formed and solidified in the past, the PDI seeks to more directly assess the still-evolving representations of the relationship of a parent with his or her young child. As Slade points out, the relationship between the parent and his or her infant, while certainly shaped to a large degree by the parent's relationship to his or her own parents, will differ in many ways, subject to the unique influences of the circumstances as well as the infant's unique characteristics (30). For the parents of pre-verbal infants, the PDI also has the advantage of more directly probing the parent's knowledge of and curiosity about their child's still-relatively-obscure mental states.

As such, the PDI, like the AAI, was also well-suited for the assessment of mentalization and reflective functioning, and the reflective functioning scale that had been developed for the AAI was adapted to fit the PDI (31). This parental relationship-specific form of reflective functioning is called *parental reflective functioning*.

The current study

The primary aims of this study were to explore the relationship between parental reflective functioning, as measured by the Parental Reflective Functioning Questionnaire (PRFQ-1), a novel measure of parental reflective functioning, and measures of distress tolerance and emotion regulation in mothers of young children. Specifically, it was of interest whether reflective functioning would:

1. Predict the mothers' ability to tolerate distress, as measured in the laboratory by the Simulated Baby paradigm (SBP) and the Paced Auditory Serial Addition Task-Computer Version (PASAT-C).
2. Predict the mothers' ability to regulate their emotion, as measured by the following self-report measures: the Emotional Regulation Questionnaire (ERQ), Difficulties in Emotional Regulation Scale (DERS), and Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A).

Three main hypotheses were formulated in light of the current theory linking parental reflective functioning, stress tolerance, and emotional regulation. Firstly, it was predicted that higher

levels of maternal reflective functioning would be associated with decreased levels of distress in the setting of an emotionally dysregulated infant in the Simulated Baby Paradigm as well in the non-infant-related context of the PASAT-C. Secondly, it was predicted that higher levels of maternal reflective functioning would be associated with an increased ability to regulate one's emotions as demonstrated in the ERQ, DERS, and BRIEF-A self-report measures. Thirdly, it was predicted that a mother's ability to regulate her emotional states in general would be positively associated with her ability to tolerate negative emotions in response to stress, particularly the stress of responding to a simulated infant's distress. It will be important, however, when assessing the relationship between emotion regulation and stress tolerance, to account for the likely influence of reflective functioning on both outcomes, as suggested by Fonagy and colleagues' social-biofeedback model of emotion regulation. (3)

Method

Participants

A group of mothers (n=26) from the New Haven, CT area were recruited to participate in this study by Linda Mayes, MD., and Helena Rutherford, Ph.D., at the Yale Child Study Center, New Haven, CT. The study was approved by the Yale School of Medicine IRB. Participants were recruited through posters or through other parenting studies. Mothers were paid \$40 for their participation. Each mother was also debriefed following completion of the Simulated Baby Paradigm task to reiterate that their performance on the task, which is explained in detail

below, was not a reflection of their child-caring skills. Each mother was given a verbal and written debriefing, which they signed following testing.

The mothers' age ranged from 17 to 42 years, with a mean of 28.6 years and a standard deviation of 6.6 years. The ages of their youngest children ranged from 2 to 54 months, with a mean age of 9.5 months and a standard deviation of 12.2 months. 12 mothers identified their ethnicity as African American not of Hispanic origin, 9 identified as White not of Hispanic Origin, 3 identified as Asian, 1 identified as Hispanic or Latino, and 1 identified as Other.

Measures and Procedure

Part I: PRFQ-1

The PRFQ-1 is a brief self-report questionnaire developed by Luyten and colleagues (32) to measure parental reflective functioning in the specific context of the parent-child relationship. Research has shown that parental reflective functioning may not be fully generalizable from more global measures of reflective functioning or reflective functioning in the context of other attachment relationships (3). While not intended to replace the Parental Reflective Functioning Scale for scoring the PDI, which takes more than an hour to administer and which requires a trained coder to score, the PRFQ-1 has the advantage of being simpler and faster to administer and score.

The PRFQ-1 (*see Appendix A*) was also developed within the context of research demonstrating that reflective functioning is a multidimensional construct. (15) Thus, the PRFQ-1 was created with items to specifically assess three dimensions of reflective functioning: (a) awareness that

mental states underlie behavior, curiosity about mental states underlying behavior, efforts to explore the mental states underlying behavior, and awareness that mental states may be opaque, (b) non-reflective modes of thinking or defenses against mentalizing, and (c) recognition of the developmental aspects of mental states. The development of subscales of parental reflective functioning in line with these dimensions was also a consideration, and will be addressed below.

The PRFQ-1 was designed to be a brief assessment of parental reflective functioning that would be easy to understand, applicable to both mothers and fathers from various socioeconomic and educational backgrounds, and easy and practical to administer to large groups. The PRFQ-1 is aimed at the parents of children aged 0-3 years, when the majority of the child's communication with their parents is non-verbal and mental states must be inferred from the child's behavior.

In its current form, the PRFQ-1 contains 39 statements with instructions to rate each one according to a 7-point Likert scale from 1 ("strongly disagree") to 7 ("strongly agree"), with 4 representing "neutral" or "undecided." The items were formulated to be scored according to three sub-scales: (a) one with high scores representing increased reflective functioning (eg. "My child and I can feel differently about the same thing."), (b) one with low scores representing increased reflective functioning (eg. "My child knows when I am having a bad day and does things to make it worse."), and (c) one with middle, or neutral, scores representing increased reflective functioning and scores at either extreme representing decreased reflective functioning (eg. "When I get angry with my child, I always know the reason why.") This latter

subset of items was thought to be useful in distinguishing between parents who respond with pseudo-mentalizing and socially desirable responses from more genuinely reflective parents.

The PRFQ-1 has been administered to two samples of parents as part of pilot projects exploring the validity and factor structure of the PRFQ-1 (33), though its validity and factor structure have not yet been reported.

Part II: Distress tolerance measures

Simulated Baby Paradigm

During the Simulated Baby Paradigm, the participants individually interacted with a life-like computer controlled simulated infant that could be programmed to emit high-pitched distress cries for varying periods of time and with varying degrees of responsiveness to soothing. The simulated baby was purchased from Realityworks, a company that produces infant simulators for parenting programs (<http://www.realityworks.com/realcare/realcarebaby.html>). The simulator was linked wirelessly to a laptop computer that controlled the initiation and duration of emitted cries. The gender of the simulator (boy, girl) of the simulated infant were matched with the gender of the mother's youngest infant (all mother's reported having infants under 2 years of age). The Simulated Baby Paradigm had two components. (1) Participants viewed a 2.5 minute interaction between the simulator and the experimenter. The simulator emitted cries throughout but at the end of this period, the experimenter was able to successfully soothe the simulator due to predefined settings where the presentation of a micro chipped feeding

bottle synched with the simulator and laptop and the crying stopped. (2) The participant was then left alone with the simulator, which began crying once the experimenter has left the room. Participants were instructed that the task is to soothe the simulator and to continue soothing behaviors until the cries stopped. They were also told they could stop the task whenever they liked by ringing a bell left in the room. In half of the simulations, the mothers were alone in the room with the simulated infant. In the other half of the simulations, the experimenter remained inside the room with the mother and simulated infant. A number of props (spare diaper, feeding bottle, book, rattles) were available in the room for the participant to use if they desired. Unbeknownst to the participants, however, unlike in the demonstration scenario, the experimental simulation was designed such that no amount of soothing could successfully calm the baby. The simulated baby's cries would continue until the participant chose to end the simulation or until 20 minutes had passed, at which time the experimenters would end the simulation. The participants' length of time participating in the simulation would be recorded as an index of stress tolerance. To ascertain whether the SBP evoked a physiological stress response, the experimenters collected heart rate and blood pressure from 14 of the 26 participants when the participants had consented (baseline 1), 20 minutes into the visit after completing initial questionnaires (baseline 2) prior to the SBP (pre-stress), after the SBP (post-stress). As mentioned above, each mother was debriefed about their experience with the simulated baby after completion of the task, specifically to reassure them that their performance on the task was not a reflection of their child-caring abilities.

PASAT-C

The Paced Auditory Serial Attention Task-Computerized Version (PASAT-C) (34) is a modified computerized version of the original PASAT, which has been shown to be an effective inducer of psychological stress (35). In this task, numbers are sequentially flashed on a computer screen, and participants are asked to add the currently presented number to the previously presented number before the subsequent number appears on the screen. A loud error noise accompanies any miscalculations. The task consists of three progressively-difficult levels with decreasing latencies between number presentations. Specifically, the first level of the PASAT-C provides a 3 second latency between number presentations (i.e., low difficulty), a 2 second latency during the second level (i.e., medium difficulty), and a 1 second latency during the final level (i.e., high difficulty). The three levels last for a maximum of 10 minutes (600 seconds), with the participant having a termination option at any time. Stress tolerance is indexed as latency in seconds to task termination.

Part III: Self-report measures of emotion regulation

BRIEF-A

The Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A) (36) is a 75-item self-report measure that was developed initially to assess children who had suffered traumatic brain injuries, but has been adapted for use with adults aged 18-90. The measure contains 9 distinct clinical subscales that measure various aspects of executive functioning and emotion regulation: Inhibit, Self-Monitor, Plan/Organize, Shift, Initiate, Task Monitor, Emotional Control, Working Memory, and Organization of materials. The clinical scales form two broader indices: the Behavioral Regulation Index (BRI) and the Metacognition Index (MI). These two indices

generate an overall Global Executive Composite (GEC) score. Test-retest reliability across the clinical scales ranged from .82-.93 over an average interval of 4.22 weeks (37).

ERQ

The Emotion Regulation Questionnaire (ERQ) (38) is a self-report measure of two systemic emotional regulation strategies: cognitive reappraisal (eg. “When I want to feel more positive emotion (such as joy or amusement), I change what I’m thinking about” and expressive suppression (eg. “I keep my emotions to myself”). The measure includes 10 items that respondents must answer according to a 7-step scale, from 1 (“strongly disagree”) to 7 (“strongly agree”), with 4 signifying “neutral.” Internal consistency reliability of the cognitive appraisal scale ranged from .75 to .82 while the reliability of the expression suppression scale ranged from .68 to .76 across 4 samples. Test–retest reliability across 3 months was .69 for both scales. Construct validity was estimated at .53 for the expression suppression scale ($p < .001$) when compared with a peer-rated independent data source. Validity for the cognitive reappraisal scale was estimated at .24 ($p = .05$) with a peer-rated reappraisal index.

DERS

The Difficulties in Emotional Regulation (DERS) (39) is a 36-item self-report measure that assesses difficulties in emotional regulation across six dimensions wherein difficulties may occur, including (a) nonacceptance of emotional responses (NONACCEPTANCE), (b) difficulties engaging in goal directed behavior (GOALS), (c) impulse control difficulties (IMPULSE), (d) lack of emotional awareness (AWARENESS), (e) limited access to emotion regulation strategies

(STRATEGIES), and (f) lack of emotional clarity (CLARITY). Participants indicate how often the items apply to themselves, with responses ranging from 1 to 5, where 1 is almost never (0–10%) and 5 is almost always (91–100%). The measure yields a total score as well as scores on the six dimensions listed above. The DERS was found to have an overall high internal consistency ($\alpha = .93$), with each of the DERS subscales having internal consistency of $\alpha > .80$. The overall DERS score had a test–retest reliability of .88 over a period ranging from 4 to 8 weeks. The DERS has also been shown to have adequate construct and predictive validity overall and for each of the subscales (39).

Statistical Analysis

The data collected here were analyzed using SPSS Statistics, version 17.0. The initial hypotheses were examined using correlations, while the exploratory analyses were conducted using partial correlations and regression modeling. For these analyses, the PRFQ-1 was considered to be the dependent variable and no demographic data from the sample, such as maternal age, level of education, or presence of other children in the household were found to be covariates with the PRFQ-1. Scale scores from each of the self-report measures were normally distributed.

Results

PRFQ-1

PRFQ-1 scores for the twenty-six mothers ranged from 2.56 to 5.00. The sample was normally distributed with a mean of 3.53 with a standard deviation of 0.53 and a median of 3.63. See Figure 1 for a graphical representation of the distribution.

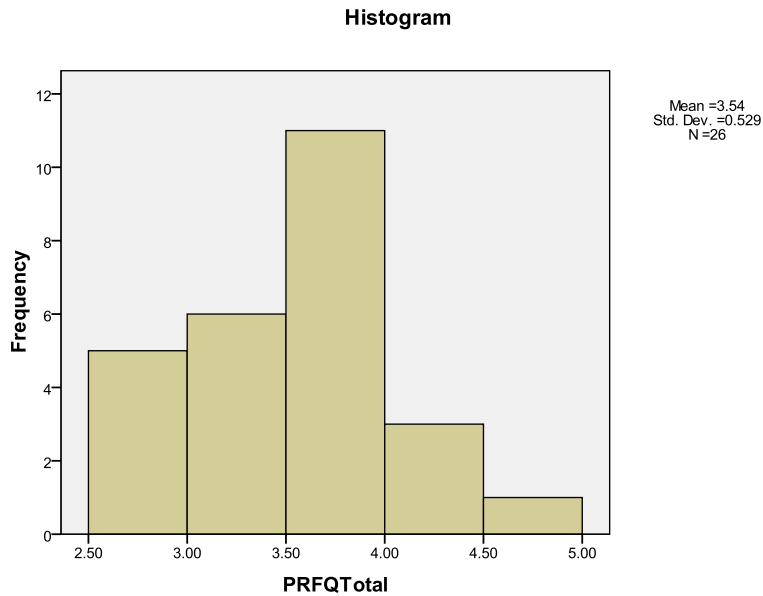


Figure 1: PRFQ-1 distribution. *Std.Dev.* = standard deviation; *PRFQTotal* = Parental Reflective Functioning Questionnaire -1, total score. The PRFQ-1 was found to meet the expectation for normal distribution.

Simulated Baby Paradigm: Behavior and Physiology

Nine of twenty-six mothers completed the simulated baby paradigm task, remaining in the room with the crying doll for the full 20 minutes. Seventeen of the mothers opted to end the simulation prior to 20 minutes. The range of time spent in the task was 199 seconds to 1200 seconds (20 minutes). The mean time spent in the task was 776 seconds, with a standard deviation of 391 seconds.

Heart rate (measured by beats per minute, bpm) and blood pressure from a subgroup of 11 mothers who completed the task demonstrated that both heart rate (64 bpm pre- compared to 74 bpm post-simulator, $p < .05$) and blood pressure (116/86 pre- compared to 125/88, $p < .05$ systolic only) increased following the interaction. Increased heart rate and blood pressure parallels findings of other stress induction studies (40,41) and supports the validity of the Simulated Baby Paradigm as a stress induction technique.

PASAT

While all mothers completed the PASAT, only six mothers endured the task to completion (which required that the mothers to remain in the task for 10 minutes). 20 mothers opted to end the task early. Persistence in the PASAT ranged from 0 seconds to the full 10 minutes (600 seconds), with a mean time of 212 seconds and a standard deviation of 248 seconds. No physiological measures of stress were taken, though past research suggests that participants in the PASAT have experienced significant increases in skin conductance and heart rate, which converges with systolic blood pressure (34).

Emotion Regulation Measures

All 26 of the mothers completed the DERS, ERQ, and BRIEF-A self-report questionnaires. See Table 1 for the range, mean, and standard deviation of each measure and its subscales.

Measure	Minimum	Maximum	Mean	Std. Deviation
DERS Total	42.00	104.00	64.03	13.75
DERS Nonacceptance	6.00	22.00	9.42	3.96
DERS Goals	5.00	19.00	10.53	3.47
DERS Impulse	5.00	23.00	10.46	4.13
DERS Awareness	7.00	24.00	13.11	4.21
DERS Strategy	8.00	22.00	12.11	3.72
DERS Clarity	5.00	19.00	8.38	3.12
ERQ Reappraisal	4.00	7.00	5.61	.95
ERQ Suppression	1.00	5.25	3.45	1.17
BRIEF-A GEC	9.00	15.18	11.69	1.66
BRIEF-A Behavior Regulation	4.00	7.78	5.44	.91
BRIEF-A Metacognition	5.00	8.86	6.24	1.00
BRIEF-A Inhibit	1.00	1.88	1.28	.22
BRIEF-A Shift	1.00	1.83	1.32	.26
BRIEF-A Emotional Control	1.00	2.40	1.43	.38
BRIEF-A Self Monitoring	1.00	2.00	1.39	.27
BRIEF-A Initiation	1.00	1.88	1.22	.25
BRIEF-A Working Memory	1.00	1.88	1.25	.24
BRIEF-A Plan/Organize	1.00	1.70	1.20	.18
BRIEF-A Task Monitoring	1.00	2.00	1.28	.25
BRIEF-A Organization of Materials	1.00	2.00	1.27	.33

Table 1: Descriptive characteristics of the emotion regulation self-report measures (n=26). *Std. deviation* = Standard Deviation; *DERS* = Difficulties in Emotion Regulation Scale; *ERQ* = Emotion Regulation Questionnaire; *BRIEF-A* = Behavior Rating Inventory of Executive Function – Adult; *GEC* = Global Executive Composite.

Initial Correlations

To investigate the hypothesized relationships between parental reflective functioning, stress tolerance, and emotion regulation in the sample of 26 mothers, scores on the PRFQ-1, PASAT, Simulated Baby Paradigm, DERS, ERQ, and BRIEF-A, including total scores and subscales for each where applicable, were submitted to correlational analyses.

The first hypothesis predicted that increased parental reflective functioning as measured by higher scores on the PRFQ-1 would be associated with decreased levels of stress in the Simulated Baby Paradigm and on the PASAT-C and greater time spent in each task. However, the initial results did not bear this out. The PRFQ-1 was not significantly correlated with persistence times in the PASAT-C ($r = -.011, p < .959$) or Simulated Baby Paradigm ($r = .136, p < .506$)

The second hypothesis predicted that increased parental reflective functioning would be associated with higher emotion regulation scores on the ERQ, DERS, and BRIEF-A. Again, this was generally not born out in the results. Neither the ERQ Suppression ($r = -.066, p < .750$) or Reappraisal ($r = .206, p < .313$) scales nor the BRIEF-A Global Executive Composite score ($r = .207, p < .309$) or BRIEF-A Emotional Control scale ($r = .286, p < .156$) were significantly correlated with the PRFQ-1. There was, however, a statistically significant positive correlation between the PRFQ-1 and the DERS total score, though the strength of this correlation relies on the contribution of one outlier ($r = .442, p < .024, \text{ see figure 2}$). However, because higher DERS scores indicate worse self-reported ability to regulate emotion, the correlation was not in the anticipated direction. A similar positive correlation was observed between the PRFQ-1 and

DERS Nonacceptance subscale ($r=.562, p<.003$) and the PRFQ-1 and the DERS Clarity subscale ($r = .548, p <.004$), though no significant correlations were found between the PRFQ-1 and the other DERS subscales: the Goals subscale ($r = .160, p <.436$), the Awareness subscale ($r = .115, p <.577$), Impulse subscale ($r = .022, p <.914$), or Strategy subscale ($r = .271, p <.180$).

The third hypothesis predicted that greater levels of emotion regulation, as measured by the ERQ scales, DERS, and BRIEF-A, would be associated with decreased levels of stress in the Simulated Baby Paradigm and PASAT-C. The results generally did not bear this out. There was a nearly-significant correlation in the anticipated direction between the DERS total and time spent in the Simulated Baby Paradigm task ($r = -.382, p <.054, \textit{see figure 3}$). Notably, the Simulated Baby Paradigm scores were also marginally correlated to the DERS Impulse subscale ($r= -.345, p <.084$) and DERS Strategy subscale ($r= -.369, p <.064$). However, there were no other significant correlations between the emotion regulation measures and the measures of stress tolerance.

Overall, parental reflective functioning did not appear to correlate well with any of the measures of emotion regulation or stress tolerance aside from the DERS total, DERS Nonacceptance, and DERS Clarity subscales. The Simulated Baby Paradigm persistence times were also marginally correlated with the DERS total and various subscales, though generally not with the other measures assessed here.

These findings may suggest that the measures used do not accurately capture reflective functioning, emotion regulation, or stress tolerance, that reflective functioning does not correlate equally with all aspects of emotion regulation and stress tolerance, or that the basic

hypotheses of this thesis are not valid in this sample. However, the results of the correlations between the PRFQ-1, DERS, and Simulated Baby Paradigm may also suggest that parental reflective functioning interacts with emotion regulation and stress tolerance in a more sophisticated manner, a possibility also suggested by the social-biofeedback model of Fonagy and colleagues (3). According to this theory, mentalization or reflective functioning is the foundation for the development of both emotion regulation and stress tolerance in the child. In order to control for the contribution of reflective functioning to both emotion regulation and stress tolerance, the data have been submitted to further statistical analysis.

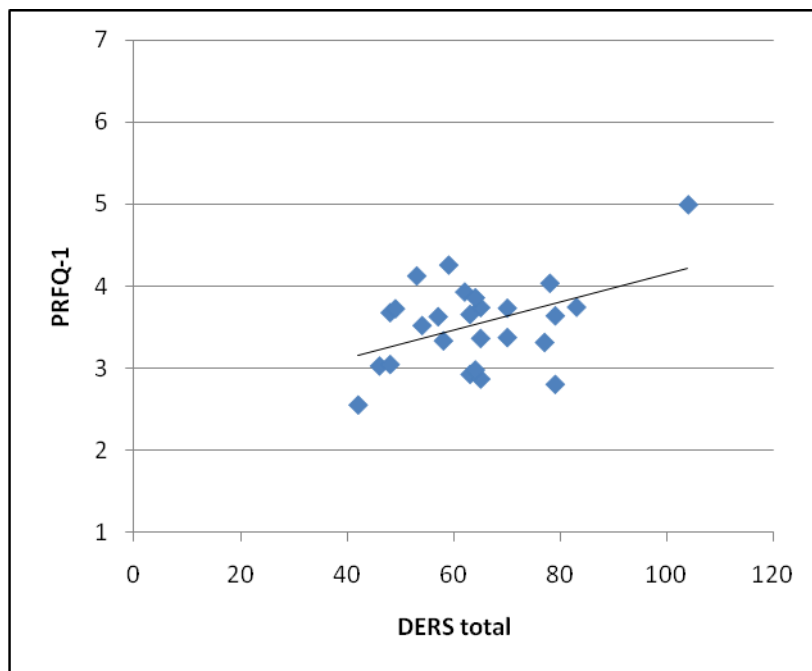


Figure 1: Scatter plot illustrating scores on the PRFQ-1 according to total DERS scores with line of best fit.

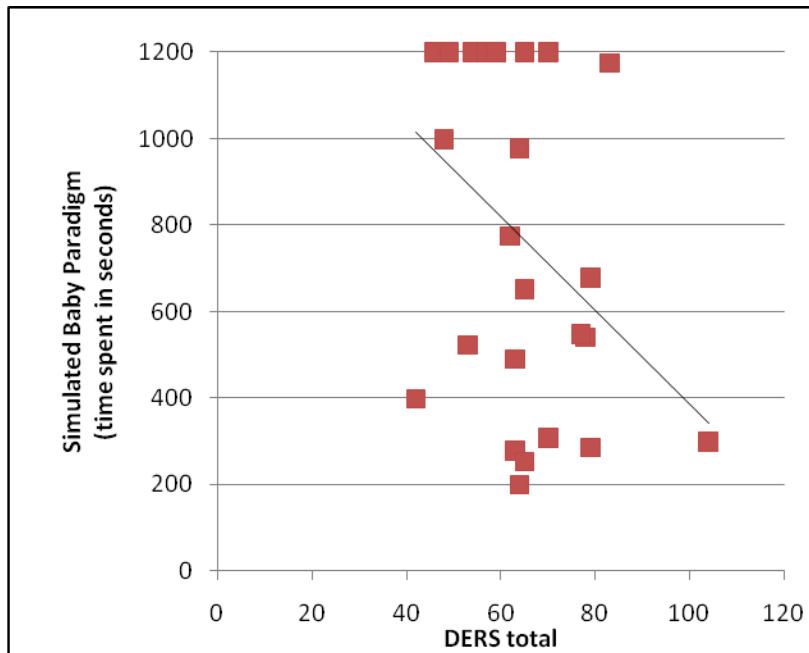


Figure 2: Scatter plot illustrating persistence time in the Simulated Baby Paradigm according to total scores on the DERS with line of best fit. N.B. Maximum time allowed in Simulated Baby Paradigm was 20 minutes (1200s).

Controlling for Parental Reflective Functioning

According to the social-biofeedback model of Fonagy and colleagues (3), reflective functioning may influence both emotion regulation and stress tolerance, and may even modulate the relationship between emotion regulation and stress tolerance. Considering the relationship between the DERS and the PRFQ-1 and the relationship between the DERS and Simulated Baby Paradigm in this sample, it was deemed important to explore whether parental reflective functioning may mediate self-report and behavior in this task. To achieve this, exploratory analysis utilized partial correlations and regression analyses.

Partial Correlations. The correlation between the DERS total and time spent in the Simulated Baby Paradigm was further analyzed to control for the possible influence of parental reflective functioning on both. The first analysis examined the relationship between DERS total and persistence in the Simulated Baby Paradigm while controlling for the PRFQ-1. The data were submitted to a partial correlation, which showed that the positive correlation between DERS total and the time spent in the Simulated Baby Paradigm ($r = -.497, p < .011$) remained when controlling for PRFQ-1 total score. Notably the strength of this positive relationship increased, with the relationship being statistically significant and no longer marginally significant as reported above.

The second analysis examined the relationship between the DERS total and the Simulated Baby Paradigm, grouping mothers according to whether they completed the task (lasting the full 20 minutes) versus or ended the task early, while also controlling for the influence of the PRFQ-1. DERS total was held as dependent variable. Univariate ANOVA was significant for the contributions of both the PRFQ-1 [$F(1,26) = 7.49, p < .012$] and Simulated Baby Paradigm [$F(1,26) = 6.837, p < .015$] to the DERS total, suggesting that both the PRFQ-1 and completion or non-completion of the Simulated Baby Paradigm were predictive of the DERS. These analyses suggest that parental reflective functioning, stress tolerance, and self-appraisal of emotion regulation are strongly interrelated and dependent on one another.

Regression. While the direct correlation between the PRFQ-1 and the time spent in the Simulated Baby Paradigm was not statistically significant ($r = .136, p < .506$), a regression

analysis was performed to assess, in the context of the results of the partial correlations above, whether the relationship between the Simulated Baby Paradigm and PRFQ-1 might be dependent on the DERS total. Together, PRFQ-1 and DERS total explained a significant proportion of variance (approximately 26%) in Simulated Baby Paradigm persistence times, $R^2 = .261$, $F(2, 23) = 4.072$, $p < .031$. As expected, DERS total significantly predicted Simulated Baby Paradigm scores, $\beta = -.549$, $t = -2.75$, $p < .011$. In conjunction with the DERS total, the PRFQ-1 was shown to be nearly significant in predicting Simulated Baby Paradigm results, $\beta = .379$, $t = -1.90$, $p < .070$, demonstrating the additive effect of the DERS total on the PRFQ-1 in accounting for Simulated Baby Persistence times, and lending further support for the interrelatedness of these measures.

A regression analysis was also performed to assess the influence of the PRFQ-1 and time spent in the Simulated Baby Paradigm on the DERS total. Together, the PRFQ-1 and Simulated Baby Paradigm explained a significant proportion of the variance in DERS total scores, $R^2 = .394$, $F(2, 23) = 7.49$, $p < .003$. As expected from their correlations, both the PRFQ-1 [$\beta = .503$, $t = 3.07$, $p < .005$] and Simulated Baby Paradigm [$\beta = -.450$, $t = -2.75$, $p < .011$] significantly predicted the DERS total, together accounting for approximately 39% of the DERS total scores, and further supporting the interdependence of emotion regulation, stress tolerance, and reflective functioning.

Discussion

According to Fonagy and colleagues (3), mentalizing ability and reflective functioning are the developmental foundation of successful emotion regulation, including the ability to regulate negative emotions and stress. According to their model, an individual must be able to mentally reflect on an emotional experience in order to modulate one's response to that emotion. As such, it has been hypothesized that reflective functioning, emotion regulation, and stress regulation would be intimately and positively correlated; specifically, greater reflective functioning would equal greater emotion regulation and greater stress regulation. This assertion of their relatedness, however, has not yet been directly examined (2). The results of this study point to both the validity and complexity of this hypothesis, which will now be discussed.

Three primary hypotheses were examined in light of the current theory linking parental reflective functioning, stress tolerance, and emotional regulation. Firstly, it was predicted that higher levels of maternal reflective functioning, as measured by the PRFQ-1 self-report questionnaire, would be associated with decreased levels of distress in the setting of an emotionally dysregulated infant in the Simulated Baby Paradigm as well in the non-infant-related context of the PASAT-C. Secondly, it was predicted that higher levels of maternal reflective functioning would be associated with an increased ability to regulate one's emotions as demonstrated in the ERQ, DERS, and BRIEF-A self-report measures. Thirdly, it was predicted that a mother's ability to regulate her emotional states in general would be positively

associated with her ability to tolerate negative emotions in response to stress, particularly the stress of responding to a simulated infant's distress. The results of this study do not generally support these hypotheses as stated. Initial correlations between these measures are for the most part insignificant, and even among the significant correlations, such as between the PRFQ-1 and the DERS, they are often in the opposite direction of their predicted association.

Exploratory analysis of the data, however, using partial correlations and regressions to control for the influence of reflective functioning on the other variables, suggests that these relationships can be empirically validated in this sample. According to these exploratory analyses, reflective functioning, emotion regulation, and stress tolerance are highly interdependent on one another and interact in complex ways. Furthermore, reflective functioning may not relate to all aspects of emotion regulation and stress tolerance equally.

Reflective Functioning and Emotion Regulation

The relationships between reflective functioning and the various measures of emotion regulation in this study were mixed, indicating both the difficulty of capturing emotion regulation and the possibility that reflective functioning does not correlate equally to all aspects of emotion regulation.

Emotion regulation has traditionally been difficult to measure and even to define (17,39). While it is often referred to as a singular characteristic or trait, emotion regulation is better conceptualized as a collection of distinct, though related, capacities, both conscious and unconscious, and both emotional and behavioral. Most importantly, these include the

flexibility with which one is able to choose emotion regulation strategies, one's awareness and acceptance of one's emotions, and one's capacity to modulate the intensity of an emotion to reduce the urgency of the response to the emotion. Further complicating the matter, according to Gross, is the fact that these capacities have significant overlap with similar concepts such as coping, mood regulation, and psychological defenses (42).

Simple correlations between various measurements included in this study revealed a strong positive correlation between parental reflective functioning, as measured by the PRFQ-1, and emotional regulation, as measured by the DERS. At face value, this finding would indicate that greater reflective functioning is associated with lower self-appraisal of one's capacity for emotion regulation, and thus greater emotion dysregulation. The positive direction of the correlation is counterintuitive, however, given the expectation that greater reflective functioning is intrinsic to better emotion regulation.

Rather than indicating an inverse relationship between emotion regulation and reflective functioning, however, these findings may speak more to the nature of the DERS and the mechanisms that it is capturing. As the DERS is a subjective self-report of one's responses to stress and negative emotions, a higher score may paradoxically represent greater self-knowledge, and thus greater reflective capacity. It may be likely, then, that the DERS is capturing reflective functioning in the context of one's emotion regulation, as opposed to being a more direct measure of one's emotion regulation or dysregulation.

The strong positive correlation between the PRFQ-1 and the DERS Clarity subscale supports this notion. The Clarity subscale was designed to assess the extent to which individuals know the

emotion that they are experiencing, a capacity that has significant overlap with mentalization and reflective functioning. This subscale includes items such as “I have difficulty making sense out of my feelings,” in which a score of 5 indicates “almost always” and a score of 1 indicates “almost never.” It also includes reverse-scored items such as “I know exactly how I am feeling,” in which a 5 indicates “almost never” and a 1 indicates “almost always.” In both of these cases, a subjective rating of 5 might indicate that the individual does not generally have access to their emotional states, indicating lower reflective functioning and worse emotion regulation. On the other hand, a rating of 5 might indicate a more realistic, and perhaps more accurate, understanding of the individual’s own mental states, and thus a greater reflective capacity.

Interestingly, though, the PRFQ-1 did not correlate with the mothers’ scores on the DERS Impulse Control subscale, Strategy subscale, Goals subscale, or Awareness subscale. Unlike the Clarity subscale, the Impulse Control subscale, for example, was designed to measure an individual’s deficits in controlling one’s behavior when experiencing negative emotions and stress. Included are items such as “When I’m upset, I lose control over my behaviors,” and “When I’m upset, I feel out of control.” For both items, a subjective rating of 5 indicates agreement “almost always” and a rating of 1 indicates “almost never.” As such, the Impulse subscale appears to screen for problematic emotion dysregulation in response to stress. Though the items in this subscale may be representative of an aspect of emotion dysregulation, and one theoretically reliant on aspects of reflective functioning, they do not appear to specifically capture one’s insight or awareness of emotional experience in the same way as the Clarity subscale.

These results suggest that reflective functioning may not correlate with all aspects of emotion regulation equally, and that parental reflective functioning, specifically, may not relate as well to general features of one's capacities for emotion regulation. In sum, the strong positive correlation of the DERS total score and the Clarity subscale with the PRFQ-1, as well as the lack of correlation with the Impulse Control subscale, suggest that the DERS may, in some ways, be functionally a proxy for reflective functioning and less an accurate reflection of one's emotion regulation or dysregulation.

In contrast to the DERS, the ERQ and BRIEF-A did not correlate with scores on the PRFQ, suggesting either that reflective functioning is not directly related to emotion regulation or that the ERQ and BRIEF-A are not capturing aspects of emotion regulation relevant to reflective functioning. The ERQ was designed to assess two aspects of emotion regulation: an individual's tendency to use cognitive reappraisal or reframing and the tendency to suppress expressions of emotion. These tendencies represent different strategies of emotion regulation rather than specific emotion regulation capacities. For example, the Suppression subscale includes items such as "I control my emotions by not expressing them." The Cognitive Reappraisal subscale includes items such as "When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm." Higher scores on the items indicate strong agreement with the statements. While these measures appear to capture characteristics of emotion regulation related to secondary strategies, they appear less likely to directly capture capacities fundamental to reflective functioning, such as the level of awareness of one's emotional states or the ability to flexibly attenuate behavioral responses to one's emotions.

The BRIEF-A was designed to be a global measure of executive functioning, though it does contain one subscale that is specific for emotion regulation, the Emotional Control subscale. This subscale contains 10 items such as “I get emotionally upset easily,” “People say that I am too emotional,” “My mood changes frequently,” and “I have angry outbursts.” Higher scores indicate worse self-reported emotional control, ranging from the responses “never,” scored as 1, to “often,” scored as 3. The PRFQ-1 did not correlate significantly with the BRIEF-A global score, Emotional Control, or any of the other subscales, though the Emotional Control subscale had a weakly positive correlation of $r = .286$, $p < .156$. The poor correlation with the BRIEF-A total and Emotional Control subscale may be due to the fact that the subscale was skewed towards capturing a small component of emotion regulation, emotional lability, which may not rely directly on reflective functioning capacity.

Reflective Functioning and Stress Regulation

This study attempted to operationalize stress regulation in the context of the Simulated Baby Paradigm and the PASAT task. In the Simulated Baby Paradigm, only 9 of the 26 mothers remained in the task for the full 20 minutes, indicating that a strong majority experienced enough distress to end the task early. For the 11 mothers who were tested for heart rate and blood pressure before and after the Simulated Baby Paradigm, the average blood pressure and heart rate increased significantly from before to after. Together, the behavioral and physiological data powerfully demonstrate the stressful nature of the task. A similar physiological measure for the PASAT was not attempted but would prove useful in the future to assess differential effects of maternal and non-maternal stress inductions.

Neither the Simulated Baby Paradigm persistence times nor the PASAT correlated significantly with the PRFQ-1. As detailed in the following section, the results indicate that the relationship between the stress regulation and reflective functioning may be more complex than a simple directional relationship between these two variables.

Reflective Functioning, Emotion Regulation, and Stress Regulation

For the 26 mothers, the correlation between time spent in the Simulated Baby Paradigm and scores on the DERS total, DERS Impulse subscale, and DERS Strategy subscales were moderately negative and nearly significant, with r values ranging from $-.345$ to $-.382$ and p values $< .084$. The relationship between the Simulated Baby Paradigm and the DERS was stronger, however, when controlling for each mother's score on the PRFQ-1, indicating that parental reflective functioning may be a moderating factor in the relationship between time spent in the Simulated Baby Paradigm and self-appraisal of emotion regulation as measured on the DERS. This is true for the continuous measure of time spent in Simulated Baby Paradigm as well as the between group comparison of mothers who completed the task versus those who did not. In both cases, controlling for parental reflective functioning, mothers who scored higher on the DERS were significantly less likely to complete the Simulated Baby Paradigm than mothers who scored lower on the DERS. Mothers who scored highly on the PRFQ-1 and DERS total were the least likely to complete the task. These findings indicate that reflective functioning, self-appraisal of emotion regulation, and behavior in a stressful task interact in a complex fashion. One possible model for the observed interaction in this study is that greater self-reflective capacity, as measured by a higher score on the DERS total and DERS Clarity subscale, leads to a

more acute awareness of one's distress in the Simulated Baby Paradigm and a stronger desire to end the task prematurely. Greater parental reflective function, as measured by a higher score on the PRFQ-1, may lead to a more acute awareness of the distress of the crying simulated baby during the task, and may contribute to an even stronger desire to end the task early. Overall, the results suggest an inter-related and interdependent relationship between parental reflective functioning, self-appraisal of emotion regulation, and behavior in a stressful parenting situation, with parental reflective functioning acting as a strong mediator of stress and behavior. Continuation of this research with a larger sample may clarify this relationship.

The present study was limited mostly by its small sample size, which left the results vulnerable to outlier effects, the self-report nature of the measures utilized, and the difficulty in capturing data about an individual's emotion regulation. The PRFQ-1 is a novel self-report questionnaire designed to assess reflective functioning in the specific context of the caregiver-infant relationship. The questionnaire holds great promise, and while it is still in the process of refinement and validation, it has distinct advantages in terms of ease of administration and scoring relative to existing measures, but it is limited by being a self-report measure. Self-report measures in general, and specifically in the case of reflective functioning, will be limited in terms of their reliance on conscious awareness of largely unconscious processes (39). The Simulated Baby Paradigm, while a more naturalistic method of assessing stress tolerance than a self-report measure, nonetheless may be limited by its artificial setting and use of a mechanized, rather than real, infant.

Reflective functioning has traditionally been assessed by lengthy standardized interviews such as the AAI and the PDI, which, while ultimately subjective, are capable of accessing unconscious mechanisms and internal models of relating to others (31). In contrast, the PRFQ-1 is a self-report measure, relying on the parents' conscious awareness of their propensities to mentalize and reflect on their children's mental states. The PRFQ-1 may also capture only limited aspects of parental reflective functioning, which has been shown to be a multidimensional and complex cognitive and emotional capacity (32). In addition, the PRFQ-1 as an assessment of parental reflective functioning is limited in that it may not capture the parents' reflective capacities under stress. Stressful situations have been shown to negatively influence reflective functioning, particularly in insecurely attached individuals (43).

A similar limitation can be seen in self-report measures of emotion regulation, such as the DERS, ERQ, and BRIEF-A. However, these measures have the additional limitation of assessing rather narrow aspects of emotion regulation. In the case of the ERQ, the focus is on specific strategies of emotion regulation, namely the tendencies for an individual to cognitively reframe negative-emotion-eliciting situation into a positive one (cognitive reappraisal) or to suppress the expression of negative emotions (expressive suppression) (38). These strategies are certainly relevant to how an individual regulates emotions, but they do not appear to represent a global assessment of the character of one's capacity for emotion regulation. According to Gratz (39), the particular emotion regulation strategies used by an individual provide little insight into an individual's ability to regulate one's emotions effectively. Similarly, the BRIEF-A, specifically the Emotion Control subscale, focuses narrowly on the characteristic of emotional

lability, which, while relevant to mood regulation, also does not speak to the more global character of one's emotional regulation.

Indeed, given the close theoretical and conceptual links between emotion regulation, stress tolerance, and reflective functioning, it may be ultimately difficult to measure one without also capturing the others. The results of this study, specifically the strong interaction and apparent overlap between the underlying processes captured by the DERS, Simulated Baby Paradigm, and PRFQ-1, suggest that this may be the case, though further study is warranted.

Conclusion

The current findings represent an initial attempt to empirically test the theorized linkages between parental reflective functioning, self-appraisal of emotion regulation, and stress tolerance that have developed out of a multidisciplinary approach to the origins of attachment security and the study of mentalization. First, it was hypothesized that greater maternal reflective functioning, as reflected by higher scores on the PRFQ-1, would predict greater stress tolerance, as measured by persistence times in the Simulated Baby Paradigm and PASAT-C stress induction tasks, and great ability to regulated one's emotions, as measured by the DERS, ERQ, and BRIEF-A self-report measures. Additionally, it was predicted that greater emotion regulation would be positively associated with greater stress tolerance. Initial correlations did not generally support these hypotheses and further analysis suggested that the hypothesized positive associations between reflective functioning, emotion regulation, and stress tolerance do not, in fact, reflect their real-time interactions in stressful situations. Instead, parental reflective functioning seems to predict most strongly the extent to which an individual

experiences her own distress as well as the distress of her infant, influencing one's own sense of his or her emotional state, and mediating behavioral responses to stress only indirectly. These findings lend support to the theorized role for reflective functioning as the foundation of emotion regulation and stress tolerance as suggested by the social-biofeedback model of Fonagy and colleagues (3), though much further research is warranted to replicate these findings and clarify these relationships further.

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Appendix A

PRFQ-1

Listed below are a number of statements concerning you and your child. Read each item and decide whether you agree or disagree and to what extent. Use the following rating scale, with 7 if you strongly agree; and 1 if you strongly disagree; The midpoint, if you are neutral or undecided, is 4.

Strongly	1	2	3	4	5	6	7	Strongly
Disagree								Agree

- (1) ___ My child and I can feel differently about the same thing. (HL)
- (2) ___ When I get angry with my child, I always know the reason why. (M)
- (3) ___ I am often curious to find out how my child feels. (HL)
- (4) ___ How I am feeling can affect how I understand my child's behavior. (HL)
- (5) ___ My child knows when I am having a bad day and does things to make it worse. (LH)
- (6) ___ I like to think about the reasons behind the way my child behaves and feels. (HL)
- (7) ___ I try to see situations through the eyes of my child. (HL)
- (8) ___ I always know why my child acts the way he or she does. (M)
- (9) ___ My child sometimes gets sick to keep me from doing what I want to do. (LH)
- (10) ___ I believe that how I think about my child will change over time. (HL)
- (11) ___ My child can react to a situation very differently than I think he or she will. (HL)
- (12) ___ I find it hard to actively participate in make believe play with my child. (LH)
- (13) ___ At times, it takes several tries before I understand what my child needs or wants. (HL)
- (14) ___ When my child is fussy he or she does that just to annoy me. (LH)
- (15) ___ Now that I am a parent, I realize how my parents could have misunderstood my reactions when I was a child. (HL)
- (16) ___ No matter how sick my child is, I can always tolerate him or her. (M)
- (17) ___ How I see my child changes as I change. (HL)
- (18) ___ My behavior towards my child cannot be explained by how I was raised. (LH)
- (19) ___ I can always predict what my child will do. (M)
- (20) ___ I wonder a lot about what my child is thinking and feeling. (HL)
- (21) ___ Often, my child's behavior is too confusing to bother figuring out. (LH)
- (22) ___ I can sometimes misunderstand the reactions of my child. (HL)
- (23) ___ When my child is misbehaving it's a sign that he or she does not love me. (LH)
- (24) ___ I believe that how my parents raised me affects how I raise my child. (HL)
- (25) ___ My child cries around strangers to embarrass me. (LH)
- (26) ___ I pay attention to what my child is feeling. (HL)
- (27) ___ I can completely read my child's mind. (LH)

- (28) __ Understanding why my child behaves in a certain way helps me not to be upset with him or her.
(HL)
- (29) __ I believe there is no point in trying to guess what my child feels. (LH)
- (30) __ I often think about how I felt when I was a child. (HL)
- (31) __ I try to understand the reasons why my child misbehaves. (HL)
- (32) __ I always know what my child wants. (M)
- (33) __ I hate it when my child cries and/or talks to me when I am on the phone with someone. (LH)
- (34) __ The only time I'm certain my child loves me is when he or she is smiling at me. (LH)
- (35) __ I'm certain that my child knows that I love him or her. (M)
- (36) __ The best way to know your child loves you is when he or she is well-behaved. (LH)
- (37) __ My child's temperament is what it is, and there is little that I can do about that. (LH)
- (38) __ I always know why I do what I do to my child. (M)
- (39) __ At times I get confused about what my child is feeling. (M)