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MATERNAL PERSONALITY PREDICTS INFANT REGULATION OF FEAR

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ABSTRACT

Difficulty with emotion regulation early in life can lead to poor developmental outcomes, such as childhood psychopathology. Therefore, it is important to identify factors associated with emotion regulation deficits earlier, rather than later. Research has indicated that infant emotion regulation develops within the context of the mother-infant attachment relationship, so factors, such as maternal personality that impact the security of this relationship may influence adaptive or maladaptive emotion regulation in infants. In light of this, the present study aimed to further explore how dysfunctional personality traits in mothers relates to infant regulation of fear and frustration. Participants were recruited from a large, ongoing longitudinal study. Four personality constructs—negative affect, neuroticism, psychoticism, and extraversion—were measured in mothers via self-reported questionnaire data. Infant emotion regulation was assessed by using respiratory sinus arrhythmia (RSA) during tasks designed to evoke fear and frustration when infants were 8-months- and 12-months-old. Results showed that infant RSA during fear-evoking tasks was positively associated with maternal irritability and psychoticism was augmented, suggesting poor regulation. Further, during fear-evoking tasks, infant RSA was negatively associated with maternal irritability and psychoticism, suggesting better regulation.

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Chapter 1

Introduction

Emotion regulation is important in setting the tone for an individual's developmental course. Emotion regulation is a driving factor in the psychological growth of individuals by playing a role in their socioemotional development (Calkins & Keane, 2004) and becoming a large part of their personality (Cole, Michel, & Teti, 1994). Difficulty with regulating emotions during infancy can lead to childhood psychopathology, such as anxiety (Buss, 2011) or externalizing problems (Calkins & Fox, 2002). Further, these deficits in emotion regulation can continue to cause problems in adolescence and adulthood and manifest as things such as eating pathology (McLaughlin, Hatzenbuehler, Mennin, & Nolen-Hoeskema, 2011; Sim & Zeman, 2005) or personality disorders, like borderline personality disorder (BPD; Posner et al., 2003). Not only does emotion regulation develop very early in life, but it typically develops within the context of the mother-infant relationship (Calkins, 2004). Therefore, it is important to explore factors that may influence this relationship, thus also impacting an infant's ability to develop adaptive emotion regulation. These factors may include dysfunctional personality traits in mothers, as research has indicated that maternal personality dysfunction can lead to maladaptive emotion regulation in infants (Baumann, Kaschel, & Kuhl, 2005; Cole et al., 1994). Therefore, the overarching goal of the current study was to examine the ways in which maternal personality dysfunction affects infant emotion regulation at ages 8- and 12-months.

The Importance of Effective Emotion Regulation

Emotion regulation is a complex process that describes an individual's ability to adapt to changes in their evoked emotions (Cole, Martin, & Dennis, 2004), including intensity and duration of the emotions, as well as any psychological processes that may arise from expressing the emotions (Thompson, 1994). The study of emotion regulation can help us to better understand how emotions are associated with certain thoughts and behaviors that occur and predict both positive and negative developmental outcomes (Cole et al., 2004). Viewing emotions through an emotion regulation lens can help us understand how typical emotion patterns can be adaptive and helpful or maladaptive and interfere with daily functioning (Cole et al., 1994). Adaptive emotion regulation means that an individual has had their emotional goals met, such as having positive social interactions and maintaining safety by adequately expressing appropriate emotions, whether positive or negative (Bridges & Grolnick, 1995). Ultimately, one's ability to regulate emotions becomes a larger part of who they are and can lead to psychopathology if such is not done in an adaptive way (Cole et al., 1994).

The development of emotion regulation begins during infancy, typically within the context of the mother-infant attachment relationship (Calkins, 2004). Early acquisition of emotion regulation appears to play an important role in a child's socioemotional development and later psychopathology risk. For instance, Calkins and Keane (2004) found that children who were able to adaptively regulate negative emotions, such as frustration, at age 2 displayed better social skills and fewer behavioral problems at age 4.5, compared to children who were unable to effectively regulate their emotions at age 2.

Emotion regulation develops and improves rapidly from infancy to early childhood. For example, Cole et al. (2011) demonstrated that children at age 48-months are better able to

distract themselves from frustration while waiting for a gift, compared to when they are between 18- to 24-months old. Additionally, it was found that child anger displays were briefer at age 48-months, compared to their composure between ages 18- to 24-months. These results indicate that emotion regulation takes time to fully develop, while also highlighting the benefit of examining emotion regulation at a young age.

Difficulty with the regulation of negative emotions, such as fear and anger, is associated with poor developmental outcomes. Anger dysregulation, or difficulty with regulating anger, during infancy is related to increased externalizing behaviors (Calkins & Fox, 2002) and aggression (Bohnert, Crnic, & Lim, 2003); McLaughlin et al., 2011) during childhood. For example, Calkins and Dedmon (2000) demonstrated that 2-year-olds who had trouble with emotion regulation displayed more aggressive behaviors and were more defiant towards their mothers, compared to their cohorts who were able to adaptively regulate their emotions. Additionally, Hill, Degnan, Calkins, and Keane (2006) found that 2-year-old girls who had trouble with emotion regulation had higher levels of externalizing problems at ages 4 and 5. Research has also highlighted the importance of effectively regulating fear. High levels of fear, combined with poor regulation of fear, are associated with childhood internalizing problems (Rydell, Berlin, & Bohen, 2003). Fear dysregulation, or difficulty with regulating fear, in two-year-olds has been demonstrated to predict childhood anxiety symptoms (Buss, 2011; Buss et al., 2013). Additionally, trouble with regulating fear at age 6-months was predicted by higher levels of fear at age 6-months (Brooker et al., 2013)

Other literature has examined how environmental and/or genetic factors influence a child's ability to regulate emotions such as fear. For example, Southam-Gerow and Kendall (2000) found that children with a genetic predisposition to anxiety tend to have more difficulties

with emotion regulation. These studies indicate that problems with regulating fear can either be predicted by being predisposed to anxiety or can predict childhood anxiety.

How Early Emotion Regulation is Acquired

Emotion regulation begins to develop during infancy within the context of the infant-mother attachment relationship (Calkins, 2004), so factors that influence the quality of this relationship would also be expected to impact the development of emotion regulation. While a variety of child-related factors, such as temperament, biology, and cognitive development, influence the development of the mother-infant relationship and, in turn, emotion regulation (Eisenberg & Morris, 2002), maternal characteristics also play an important role. To begin, Morris, Silk, Steinberg, Myers, and Robinson (2007) proposed that children tend to model the emotion regulation behaviors of their parents. Related to this, Goldsmith, Pollak, and Davidson (2008) proposed that infants rely heavily on the emotion regulation behaviors of their mothers in developing their own, and maternal emotion regulation has been shown to predict a child's ability to regulate their own emotions at a very young age (Warren & Stifter, 2008).

How Emotion Regulation is Measured in Infancy

The most common approach to studying emotion regulation development is through laboratory-based observations. The Laboratory Temperament Assessment Battery (Lab-TAB; Goldsmith & Rothbart, 1996) is a common procedure used in assessing infant emotion regulation. The procedure involves a series of tasks that are designed to elicit emotions in infants, such as joy, fear, and frustration. These tasks involve things such as playing peek-a-boo

with infants (joy), having a novel person come into the room (fear), and restraining infants' arms while they are trying to play with a toy (frustration). While using this procedure, researchers can then use a variety of methods to actually measure emotion regulation, including behavioral coding. The behaviors that are coded from the observations of the infants during the tasks include those associated with emotional responses, like facial expressions, as well as those associated with regulation strategies, such as distraction or withdrawal, the latter being used to measure emotion regulation. In addition to behavioral coding methods, emotion regulation can be measured via psychobiological markers such as electroencephalogram (EEG) waves, cortisol levels, and electrocardiogram (ECG) data.

The use of ECG data, particularly that of respiratory sinus arrhythmia (RSA), as a measure of infant emotion regulation has been increasing in popularity with recent research. RSA is a parasympathetic measure of cardiac vagal tone and physiological regulation in children (Porges, 1991), and can be used as a measure of individual differences in emotion regulation (Porges 1995). What RSA measures is the increase in heart rate associated with inhalation and the decrease in heart rate associated with exhalation. RSA is viewed as an effective measure of emotion regulation, as it is an objective measure of how well individuals are able to respond to external stimuli at a parasympathetic level. For example, RSA during a given situation can tell us whether the individual is adaptively handling the situation (Porges, Doussard-Roosevelt, & Maiti, 1994). The use of RSA as a measure of emotion regulation involves first measuring resting, or baseline, RSA and then comparing the baseline reading to RSA during a task, such as one that is intended to elicit fear or frustration (Bornstein & Suess, 2000). Augmented RSA during the task (i.e., an increase in RSA from baseline to task), may indicate that infants have difficulty with emotion regulation, while infants who are able to suppress RSA during tasks (i.e.,

a decrease in RSA from baseline to task) is associated with better regulation of emotions that are elicited by the task, whether they be fear, anger, or joy (Calkins, Graziano, & Keane, 2007). Some research has indicated that infants who have a higher baseline RSA tend to be better at suppressing their RSA during tasks, thus being better at regulating emotions compared to infants with a lower baseline RSA (Calkins, Smith, Gill, & Johnson, 1998; Katz & Gottman, 1997; Richards & Casey, 1991; Suess & Bornstein, 2000). Additionally, research has supported the idea that RSA tends to me a stable measure of emotion regulation (El-Sheikh, 2005). Overall, RSA provides information about emotion regulation patterns in infants and children without having to rely on subjective measures like behavioral coding.

Maternal Personality Traits that Influence Infant Emotion Regulation

Difficulties with emotion regulation seen during childhood may persist into adulthood as well. For example, BPD is considered to be a disorder of emotion regulation (Posner et al., 2003), as it tends to cause emotional outbursts and erratic behavior (Personality Disorders; APA, 2013). Other research has indicated that there may be certain aspects of emotion dysregulation that are more prevalent in BPD than others, such as being unwilling to experience distress in emotions and not wanting to engage in goal-directed behavior as a result of emotional distress (Gratz, Rosenthal, Tull, Lejuz, & Gunderson, 2006). With previous research also highlighting that children tend to rely on their parents as models of emotion regulation (Goldsmith et al., 2008; Morris et al., 2007) and that maternal emotion regulation may predict infant emotion regulation (Warren & Stifter, 2008) in mind, it may be worth further exploring how maternal personality, especially aspects that tap into dysregulation, predicts infant emotion regulation.

Because emotion regulation difficulties can be a precursor to BPD (Gratz et al., 2006; Posner et al., 2003), there is indication that emotion dysregulation may also cause other problematic, or dysfunctional, personality traits to arise. Dysfunctional personality traits cause problems with individual identity and interpersonal functioning. These traits include those such as psychoticism, narcissism, neuroticism, and negative affect. The DSM-5 Alternative Model of Personality Disorders (AMPD) outlines interpersonal dysfunction as playing a key part in personality disorders (AMPD; APA, 2013), so mothers that possess personality traits that interfere with interpersonal relationships (such as the mother-child relationship) may predict emotion regulation difficulties in children.

Much of the current research on how maternal personality influences infant emotion regulation, with the exception of BPD, focuses on traits rather than specific disorders. Personality functioning plays an important role in interpersonal relationships (AMPD; APA, 2013), which includes that of the attachment relationship between mothers and infants. Healthier, or functional, maternal personality traits are associated with more secure attachment relationships with infants, compared to dysfunctional traits (Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1990). Additionally, research has demonstrated that personality dysfunction may result from maladaptive emotion regulation strategies (Baumann et al., 2005; Cole et al., 1994). With this in mind, it is possible that infants of mothers with personality dysfunction model maternal maladaptive emotion regulation strategies. With research supporting the idea that maternal characteristics play an important role in infant emotion regulation development (Goldsmith et al., 2008; Morris et al., 2007; Warren & Stifter, 2008), further assessment of these factors, such as maternal personality, may be important in understanding how maladaptive emotion regulation develops.

Not all maternal personality traits have been examined in the context of infant emotion regulation development. One of these traits is psychoticism, and to date, there is no literature that examines the direct effect that maternal psychoticism has on the development of infant emotion regulation. Psychoticism is a key trait in personality disorders like paranoid personality disorder, schizoid personality disorder, schizotypal personality disorder (Personality Disorders; APA, 2013). Individuals exhibiting psychoticism tend to be aggressive, cold, egocentric, antisocial, and unempathetic, among other things (Eysenck, 1992), which may be one explanation as to why there is a lack in literature related to maternal psychoticism and infant emotion regulation. However, there is a small research base that assesses how psychoticism in terms of psychotic disorders impacts an individual's own emotion regulation. Livingstone, Harper, & Gillanders (2009) demonstrated that individuals displaying clinical levels of psychoticism utilized similar emotion regulation strategies compared to a healthy control group, though psychotic individuals reported less happiness and more negativity in their emotional interactions. This research may suggest that psychoticism does not necessarily inhibit effective emotion regulation, but psychotic individuals are less likely to experience positive emotions than those not displaying this personality trait. It may also be true that this finding would remain constant if this research was applied to mothers of infants with developing emotion regulation. While psychotic mothers may not directly influence the development of emotion regulation strategies in their infants, the overall pattern of displaying higher levels of negative emotions may be passed on to infants, as infants tend to model maternal emotion regulation cues (Morris et al., 2007). However, more research on how maternal psychoticism influences infant emotion regulation is necessary to make a sound conclusion.

Unlike psychoticism, negative affect is a personality trait that has been widely researched in terms of how it influences the development of infant emotion regulation. Negative affect is characterized by negative emotionality, distress, sadness, low self-esteem, nervousness, tension, worry, anxiety, and irritability (Watson & Clark, 1984) and is a key trait in several personality disorders, including, but not limited to, BPD, obsessive-compulsive personality disorder, avoidant personality disorder, and dependent personality disorder (Personality Disorders; APA, 2013). High levels of maternal negative affect have been shown to negatively impact an infant's ability to effectively regulate their emotions, particularly fear (Crockenberg & Leerkes, 2004). Additionally, Calkins et al. (1998) demonstrated that 24-month-olds whose mothers were controlling in nature and had high levels of negative affect were likely to have difficulty with regulating frustration during compliance and delay tasks, compared to infants of mothers with more positive affectivity. The authors proposed that this finding may have been because controlling mothers exhibit greater control over the behavior of their children (e.g., not allowing their infants to explore their surroundings as thoroughly as they would like to), thus resulting in children's difficulty with adaptive regulation of negative emotions, like frustration. Because negative affect can interfere with empathy and influence deficits in the quality of relationships with others (Watson & Clark, 1984), it may be that the findings of Calkins et al. (1998) and Crockenberg and Leerkes (2004) resulted from deficits in forming a secure mother-infant attachment relationship. As Calkins (2004) demonstrated, it is through this attachment relationship that infants develop emotion regulation, with a secure attachment being most important in developing effective emotion regulation. Given the links between maternal and insecure attachment, it makes sense that this may interfere with adaptive emotion regulation development in infants.

Another maternal personality trait that has been researched in terms of how it predicts infant emotion regulation is neuroticism. Neuroticism is a dysfunctional personality trait that is characterized by negative affect, anxiety, and difficulties with emotion regulation (McCrae & Costa, 1996). Neuroticism is a key trait in several personality disorders, but in particular, it is a fundamental symptom in BPD. Neuroticism, and BPD in particular, cause problems with self-esteem and interpersonal skills, as well as the previously mentioned emotional outbursts and erratic behavior (Personality Disorders; APA, 2013). Generally, neuroticism and BPD restrict the infant-mother relationship, meaning that the ability to form a secure infant-mother attachment is inhibited (Conroy et al., 2012). While all personality disorders appear to inhibit the capacity for emotion regulation, BPD has been specifically labeled as a disorder of emotion regulation (Posner et al., 2003). Research has demonstrated that infants of mothers with BPD tend to have difficulty with regulating emotions like fear and frustration, likely due to the difficulties with individual emotion regulation that BPD can cause (Gratz et al., 2014). What Gratz et al. (2014) found was that infants of mothers with BPD tended to under-express emotions of fear and over-express emotions of frustration, though these differences were not directly related to maternal diagnoses of BPD; instead, the differences were likely related to the emotion regulation difficulties of the mothers with BPD. Additionally, mothers with BPD tend to respond to their infant's negative emotions by either punishing or minimizing the emotions (Kiel, Viana, Tull, & Gratz, 2017). Based on previous research related to how modeling behavior (Morris et al., 2007) and maternal emotion regulation (Warren & Stifter, 2008) impact an infant's ability to regulate their emotions, the findings from Gratz et al. (2014) suggests that maternal problems with emotion regulation related to BPD predict infant emotion regulation (i.e., if mom cannot regulate her own emotions, then the infant has no model of how to effectively regulate their own).

Maternal extraversion may also negatively influence the development of infant emotion regulation, even though extraversion is not typically viewed as a dysfunctional personality trait. Extraversion is defined as being warm, having positive affectivity, seeking excitement, and being assertive (McCrae & Costa, 1996). Research has demonstrated that mothers with high levels of extraversion tend to be warm and nurturing towards their infants (Smith et al., 2007). However, other literature suggested that mothers with high levels of extraversion are controlling over their children (Clark, Kochanska, & Ready, 2000). Morris et al. (2007) suggested that the development of emotion regulation relies partially on the family structure, including parenting style, so it is possible that highly extraverted mothers are inadvertently impacting their infant's emotion regulation development due to their controlling nature. However, due to the conflicting findings, more research on how maternal extraversion predicts infant emotion regulation would be beneficial.

The Present Study

While promising, the research base of how maternal dysfunctional personality traits predict the development of infant emotion regulation is somewhat limited, particularly in terms of how psychoticism and extraversion may play a role. Further, much of the current research that does focus on childhood emotion regulation focuses more on early childhood (age 2 and beyond) as opposed to earlier infancy. Therefore, the overarching goal of the present research was to further explore how maternal personality traits of psychoticism, neuroticism, negative affect, and extraversion predict the development of infant emotion regulation. Specifically, we considered how these maternal traits predict an infant's regulation capacity of negative emotions such as

frustration and fear. Additionally, we aimed to explore new means of assessing dysfunction in maternal personality.

Research Aim 1

The first aim of the present study was to explore new methods of assessing dysfunctional personality. Currently, there are several clinical scales that are used to measure individual levels of personality traits like negative affect, psychoticism, neuroticism, and extraversion, such as the Adult Temperament Questionnaire (ATQ-SF; Evans & Rothbart, 2007), the Beck Anxiety Inventory (BAI; Beck & Steer, 1993), the Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996), the State Trait Anxiety Inventory (STAI; Spielberger, 1983), the Positive and Negative Affect Schedule (PANAS-SF; Watson, Clark, & Tellegan, 1988), and the Eysenck Personality Questionnaire (EPQ-R; Eysenck, Eysenck, & Barret, 1985). Each of these scales are designed to get at a specific set of symptoms or aspect of personality. However, because many of these questionnaires contain items that are broader (e.g., negative emotions), we wanted to see if they could be combined to assess our constructs of interest. The idea of using factor analyses to explore means of pulling personality factors is not new and has been done by many researchers in the past (e.g., Eysenck & Eysenck, 1975; McCrae & Costa, 1996; Widiger & Trull, 2007). Modern researchers tend to do this in hopes of combating the categorical approach to diagnosing personality disorders that the current edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) currently uses (e.g., Widiger & Trull, 2007). However, the goal of doing this in the present study was to explore ways of combining personality traits that are indicative of

personality dysfunction that may play a key-role in patenting, such as negative affect, neuroticism, and psychoticism, as well as the non-dysfunctional trait of extraversion.

Research Aim 2

For the present study, we placed a particular focus on regulating negative emotions such as fear and frustration in infants, as past research has demonstrated the psychopathologic outcomes associated with poor regulation of these emotions (Bohnert et al., 2003; Brooker et al., 2003; Buss, 2011; Buss et al., 2013; Calkins & Demon, 2000; Calkins & Fox, 2002; Hill et al., 2006; McLaughlin et al., 2011; Rydell et al., 2003; Sim & Zeman, 2005). Based on the previous research highlighting the unfavorable outcomes in children of mothers with BPD (Gratz et al., 2014; Kiel et al., 2017) and high levels of anxiety (Calkins et al., 1998; Crockenberg & Leerkes, 2004), our first and second hypotheses were that mothers displaying higher levels of negative affect and neuroticism would have infants with poorer emotion regulation as marked by lass RSA suppression, or RSA augmentation.

Research has shown maternal extraversion to be both adaptive (Smith et al., 2007) and maladaptive (Clark et al., 2000) to child development. However, in the maladaptive sense, it appears that highly extraverted mothers tend to be very controlling over their children (Clark et al., 2000). Based on research by Morris et al. (2007) demonstrating that parenting characteristics can influence the development of emotion regulation, the third hypothesis was that infants of mothers displaying high levels of extraversion would show less RSA suppression during fear and frustration evoking tasks, suggesting difficulty with emotion regulation, compared to infants of mothers with lower levels of extraversion.

While research has yet to demonstrate an association between maternal psychoticism and infant emotion regulation, the literature has suggested that psychotic individuals experience more negative emotions compared to those that are positive, while demonstrating similar emotion regulation strategies to healthy individuals (Livingstone et al., 2009). Because infants tend to model maternal emotion regulation (Morris et al., 2007), our fourth hypothesis was that infants of mothers with high levels of psychoticism would not differ in their abilities to suppress RSA, compared to cohorts with mothers displaying lower levels of psychoticism. In other words, we expected that maternal psychoticism would not predict infant RSA (thus not influencing difficulties with regulating fear and frustration).

Chapter 2

Methods

Participants

Mothers and infants in the present study were recruited as part of a 3-site ongoing longitudinal project. Mothers-infant dyads participated in the present study at one of 3 visit sites: a small, rural city in the mid-Atlantic, the capital city of a mid-Atlantic state, and a large east coast city. From the 183 dyads that have been seen to date, a combined 318 participants have completed the first 3 waves of the study at infant age 4-months (n = 173), 8-months (n = 88), and 12-months (n = 58), with some dyads having already participated in multiple waves. All infants were described as being typically developing, having sustained a full-term gestation period with no birth defects of major complications during delivery.

The present study used participants who have completed at least the 8-month and the 12-month visits, as those are the first two waves when RSA data collection occurs[1]. All infant demographic data was reported by parents. Of the 8-month-old sample, the majority of infant participants were male (51.2%). Most of the infant participants were Caucasian (71.1%), with smaller percentages being Hispanic (18.4%), Asian/Pacific Islander (6.6%), and African American (3.4%). The majority of the sample had an annual household income of at least $51,000 (56.8%) and both mothers and fathers had 16 or more years of formal schooling (mothers = 69.1%; fathers = 58%).

Of the 12-month-old sample, infant gender was almost evenly split, though females held a slight majority (50.9%). Most of the infant participants were Caucasian (85.2%), with smaller percentages being Hispanic (7.4%), Asian/Pacific Islander (5.6%), and African American (1.9%). The majority of the sample had a household income of at least $51,000 (63.8%) and both mothers and fathers had 16 or more years of formal schooling (mothers = 82.6%; fathers = 62.0%).

Procedure

The overarching goal of the larger ongoing longitudinal project is to study the development of infant attention and negative affect across the first 2-years of life within the context of temperamental patterns and emotional behaviors. The study consists of a total of 5 waves for each participant, occurring at infant ages 4-, 8-, 12-, 18-, and 24-months. The 4-month visit consists of infant and parent eye-tracking, as well as infant reactivity. The remaining waves also involve infant and parent eye-tracking, bus adds psychophysiological data collection (EEG and ECG) during the infant version of the Lab-TAB (Goldsmith & Rothbart, 1996) for additional markers of reactivity.

We focused on self-reported maternal personality data and infant ECG (in this case, RSA) data in the present study. The aim of this research was to explore how maternal personality factors might influence the development of infant emotion regulation. During either the first (infant age 4-months) or second (infant age 8-months) wave of the study, mothers completed a series of personality and mental health inventories on themselves[2]. During the second and third

waves of the study (infant age 8- and 12-months), ECG data was collected from infants during a baseline period and tasks that evoked frustration or fear.

Measures

Measures of infant emotion regulation (Lab-TAB)

Infant emotion regulation was assessed by measuring RSA during the infant version of the Lab-TAB procedure. This version of the Lab-TAB consists of 7 different tasks designed to elicit emotional reactions in infants, including joy, social fear, novel fear, and frustration/anger (Goldsmith & Rothbart, 1996). While infants in the present study participated in all 7 episodes of the Lab-TAB, we placed focus on only 3 of the tasks for the present study- those being ones designed to elicit fear and frustration.

Infant frustration task.

Lab-TAB includes 2 tasks that elicit frustration in infants, but only 1 was used in the present study. The Lab-TAB frustration task used was called Arm Restraint. This task involved 2 trials. The experimenter first got the infant interested in a novel toy. After 30-seconds, the mother was instructed to hold the infant's arms so that the infant could not reach out for the toy or play with it. After 30-seconds, the infant was allowed to interact with the toy again, after which the restraint was repeated once more (Goldsmith & Rothbart, 1996).

Infant fear tasks.

Two of the Lab-TAB tasks are designed to elicit fear in infants, and both were used in the present study. The first fear task that was used was designed to evoke social fear in infants and was named Stranger Approach. During Stranger Approach, a researcher dressed in a black

sweater and baseball cap (the stranger) entered the room and stood at the corner opposite of the infant sitting in a high chair. The infant's mother was instructed to stand behind the high chair during the task. Upon entering the room, the stranger would stand quietly, looking at the infant with a neutral face, for 15-seconds, after which they said "Hello (infant's name). I am going to come a little closer to you". The stranger then moved towards the infant for 10-seconds and paused for 15-seconds, while still looking at the infant. After the 15-second pause, the stranger would say "I am going to come a little closer to you" and moved for 10-seconds until they were 1-foot in front of the infant's high chair. At this point, the stranger knelt down and looked at the infant for 15-seconds before neutrally leaving the room (Goldsmith & Rothbart, 1996).

The second Lab-TAB task used to evoke fear was Robot. The Robot task was designed to evoke novel fear in infants. During this task, a researcher placed a remote-controlled Robot on a table and had it complete a series of movements. Throughout the entirety of the task, the infant sat in a high chair in a table across from the researcher, with their mother either behind them or beside them (Goldsmith and Rothbart, 1996).

Infant psychophysiological data collection

RSA was used to measure infant emotion regulation. At both the 8-month and 12-month waves, ECG data was collected using MindWare WiFi ACQ software, Version 1.0 (MindWare Technologies, Ltd., Westerville, OH) at a sampling rate of 500ms. ECG data was collected from infants during a baseline period, as well as during each of the Lab-TAB tasks (though again, we only focused on the baseline period and the fear and the fear and frustration tasks mentioned above for the present study). In collecting ECG, ECG electrodes were placed on the infant prior

to beginning the Lab-TAB procedure. The baseline ECG collection occurred first, while the infant sat on their mother's lap while the mother and the researcher in the room remained neutral. During the baseline period, the infant was typically presented with a non-stimulating toy, such as a small stuffed animal or a sticker, in order to keep them calm. The baseline data collection lasted for roughly 4-minutes. In collecting ECG data during the Lab-TAB tasks, the infant remained connected to the ECG electrodes for the entirety of the procedure. Approximately, data collection for Arm Restraint lasted for 90-seconds, data collection for Stranger Approach lasted for 65-seconds, and Robot lasted for 120-seconds.

Data was analyzed offline using the MindWare editing program—MindWare HRV, Version 2.51, which identified interbeat-intervals (IBIs) and used a validated algorithm to detect physiologically improbably intervals based on overall distribution (Berntson, Quigley, Jang, & Boysen, 1990). Trained personnel visually inspected and edited all data for artifact identification. RSA was calculated in 30-second epochs for the frequency band 0.24-1.04 Hz. The mean RSA value from across all epochs per each of the 3 tasks was used for analyses. The baseline RSA from our 8-month-old sample ranged from 1.41 to 6.40 (M = 3.56, SD = 1.07), while baseline RSA from our 12-month-old sample ranged from 1.67 to 5.98 (M = 3.71, SD = 0.93). RSA reactivity scores were calculated for each of the 3 tasks at each time point by subtracting baseline RSA from RSA during the task. Negative reactivity scores indicated RSA suppression (i.e., better regulation), while positive reactivity scores indicated RSA augmentation (i.e., worse regulation) during the tasks. Descriptive statistics for RSA reactivity during all 3 tasks in our 8-month-old and 12-month-old samples are displayed in Table 1.

Measures of maternal personality constructs

Maternal personality constructs were assessed via self-report on the ATQ-SF (Evans & Rothbart, 2007), the EPQ-R (Eysenck et al., 1985), the BAI (Beck & Steer, 1993), the BDI-II (Beck et al., 1996), the PANAS-SF (Watson et al., 1988), and the STAI (Spielberger, 1983).

ATQ-SF.

The ATQ short form contains 77 items that assess 4 factors of adult temperament. The 4 factors are negative affect, extraversion/surgency, effortful control, and orienting sensitivity. Each of the 4 factors contains several subfactors. Within the negative affect factor, there are the subfactors of fear, sadness, discomfort, and frustration. The extraversion factor includes the subfactors of sociability, positive affect, and high intensity pleasure. The effortful control factor contains the subfactors of attentional control, inhibitory control, and activation control. Finally, the orienting sensitivity factor includes the subfactors of neutral perceptual sensitivity, affective perceptual sensitivity, and associative sensitivity. Each of the 77 items is rated by the individual using a 7-point Likert scale ranging from “extremely untrue of you (1)” to “extremely true of you (7)” (Evans & Rothbart, 2007). Of particular interest in the present study were the negative affect and extraversion factors of the ATQ-SF.

EPQ-R.

The revised version of the EPQ is a 48-item personality inventory that assesses levels of psychoticism, neuroticism, and extraversion. In addition to each of these subscales is a lie-scale that attempts to control for individuals appearing as more socially desirable within their responses. Different from most personality inventories, items on the EPQ take the for of “yes-no” responses, instead of a Likert-type scale (Eysenck et al., 1985). All three of the constructs were of interest in the present study.

Beck inventories.

The Beck Anxiety Inventory (BAI) is a 21-item questionnaire that assesses levels of anxiety symptoms in individuals, both psychological and physical. Each item is scored using a 0-3 point Likert-scale, where 0 indicates no presence of a symptom and 3 indicates severe presence of a symptom. The scores for each of the 21 items are added together and interpreted. A score of 0-21 indicates very low to no anxiety, a score of 22-35 indicates moderate anxiety, and a score greater than 36 indicates extreme anxiety (Beck & Steer, 1993).

The Beck Depression Inventory (BDI-II) contains 21 groups of 4 statements each, each assessing either physical or psychological symptoms of depression. The BDI-II is scored similarly to the BAI. Each group of statements includes items ranging from 0-3, where 0 indicates no presence of a symptom and 3 indicates severe presence of a symptom. Within each group, the participants choose 1 of the 4 statements. Like the BAI, the numbers from each group of statements are added together and interpreted at the end. A score of 0-13 indicates no depression, a score of 14-28 indicates moderate depression, and a score of 29-63 indicates severe depression (Beck et al., 1996). The BAI and the BDI-II were included in the present study to get at all of the personality constructs of interest.

PANAS-SF.

The PANAS short form consists of 20-items that measure levels of both positive and negative affect. Ten of the PANAS items measure negative affect and 10 measure positive affect. Each item consists of one word that can be contributed to either negative or positive affectivity and is scored using a 5-point Likert scale ranging from “very slightly or not at all (1)” to “extremely (5)”. Once filled out, the positive affect item scores are summed and the negative affect scores are summed. Higher scores in both categories indicates higher levels of that type of

affect (Watson et al., 1988). This inventory was included in the present study to measure negative affect, neuroticism, and extraversion.

STAI.

The STAI contains 40-items aimed at measuring anxiety. The first 20 items assess how an individual feels in the moment that they are filling out the questionnaire (state anxiety), while the remaining items assess how an individual generally feels most of the time (trait anxiety). Each of the items is scored using a 4-point Likert-scale ranging from "not at all (1)" to "very much so (4)". The higher an individual scores on the STAI, the higher their level of anxiety is assumed to be (Spielberger, 1983). The STAI was included in the present study to get at all of the personality constructs of interest.

Data reduction of maternal personality constructs

One of the aims of the present study was to explore creating factors within personality constructs across several different personality and mental health questionnaires. In an attempt to achieve this, scale items from each of the above-outlined scales that had been previously demonstrated to measure a certain construct were submitted to a principle component analysis with all items of the other scales. The purpose of this method was to utilize the rich base of maternal self-reported personality data by extracting specific constructs from several items across all of the instruments.

Factors for the maternal negative affect construct were extracted by using the negative affect items on the ATQ (26 items; 33.8%) and the PANAS (10 items; 50%), along with all of the items of the EPQ, the BAI, the BDI[3], and the STAI. Factors for the maternal extraversion

construct were extracted using the extraversion subscales of the ATQ (17 items; 22.1%) and the EPQ (12 items; 25.0%), as well as all of the items of the BAI, the BDI, the PANAS, and the STAI. Factors for the maternal psychoticism construct were extracted by using the psychoticism subscale of the EPQ (12 items; 25.0%) and all of the items if the ATQ, the BAI, the BDI, the PANAS, and the STAI. Finally, factors for the maternal neuroticism construct were extracted by using the neuroticism subscale of the EPQ (12 items; 25.0%) and all of the items of the ATQ, the BAI, the BDI, the PANAS, and the STAI. Three factors for each of the 4 personality constructs of interest were successfully extracted from each of the principle component analyses.

After extracting the factors, each of the 3 factors of all of the 4 constructs was submitted to a scale reliability analysis to verify which factors were reliable enough to undergo further analyses. Based on the results of the reliability analyses, we were able to retain 2 factors for negative affect (Factor 1- anxiety and Factor 3- irritability), 2 factors for extraversion (Factor 2- positive affectivity and Factor 3- negative affectivity), and 1 factor for neuroticism (Factor 1- Neuroticism). These factors served as our measures of maternal negative affect, extraversion, and neuroticism for the present study. Due to low reliability, we were unable to retain any of the 3 extracted factors of the psychoticism construct. In lieu of this, we used the psychoticism subscale of the EPQ as our measure of maternal psychoticism. It should be noted that the reliability for the EPQ psychoticism subscale is not excellent ($\alpha = 0.50$), however it is higher than the reliability of our extracted factors. This, combined with Eysenck's theory that uniquely added the trait of psychoticism (Eysenck & Eysenck, 1975), influenced our call to use the EPQ psychoticism subscale as our maternal psychoticism measure, instead of our extracted psychoticism factors. Results of the principle component analyses and reliabilities are displayed in Tables 2-6. Table 7 shows the items of the EPQ psychoticism subscale, as a reference.

Chapter 3

Results

Comparing Maternal Personality Effects on Infant Emotion Regulation

The effects of maternal personality on infant emotion regulation were assessed by correlating infant change in RSA for the fear and frustration tasks at both time points with the extracted factors and the psychoticism subscale of the EPQ. Within our sample, listwise deletion was used to evaluate RSA reactivity for only infants who had reactivity scores available, resulting in a smaller sample sizes for analyses. Correlation coefficients for maternal personality constructs and infant RSA are reported in Table 8. Due to the smaller sample sizes that resulted from listwise deletion of participants, the set level of significance for our correlation coefficients was a p-value that was less than 0.05. Correlation coefficients that had a p-value greater than or equal to 0.05 but less than 0.10 were deemed to be approaching a level of significance and were also included in our results. Negative correlations were found between 8-month-old infant Robot RSA and maternal negative affectivity, $r(39) = -.37$, $p = 0.02$, and maternal anxiety, $r(38) = -.29$, $p = 0.07$. These associations suggested that higher levels of maternal negative affectivity and anxiety were associated with greater infant RSA suppression during the novel fear task (i.e., infants were better able to self-regulate) at age 8-months. In contrast, maternal EPQ psychoticism was positively correlated with infant Stranger Approach RSA at infant age 8-months, $r(45) = .27$, $p = 0.08$, and infant age 12-months, $r(37) = .28$, $p = 0.09$, as well as with Robot RSA at infant age 8-months, $r(43) = .26$, $p = 0.09$. Additionally, infant Stranger Approach

RSA was also positively correlated with maternal irritability at infant age 8-months, $r(39) = .31$, $p = 0.05$, and infant age 12-months, $r(35) = .31$, $p = 0.07$. These associations suggested that higher levels of maternal psychoticism and irritability were associated with infant RSA augmentation (i.e., had more difficulty with regulation) during the novel fear task at age 8-months and the social fear task at ages 8-months and 12-months. There were no significant associations between maternal positive affectivity or neuroticism and infant RSA during any episode at either time point were found. Further, no significant associations were identified between maternal personality and infant Arm Restraint RSA at either time point.

Next, multiple regression analyses were conducted to test how additive and interaction effects between maternal personality constructs were associated with infant RSA reactivity. We tested 1 model to predict 8-month-old Stranger RSA with maternal irritability and maternal EPQ psychoticism; 3 models to predict 8-month-old Robot RSA with maternal anxiety and maternal negative affectivity, maternal anxiety and maternal EPQ psychoticism, and maternal negative affectivity and maternal EPQ psychoticism; and 1 model to predict 12-month-old Stranger Approach RSA with maternal irritability and maternal EPQ psychoticism.

The results of the multiple regressions did not indicate the presence of any significant interaction effects. However, two significant additive effects were found on infant 8-month Robot RSA. Specifically, both maternal EPQ psychoticism and maternal negative affectivity together significantly predicted infant Robot RSA augmentation (i.e., difficulty with regulation) at infant age 8-months, $F(2,36) = 8.46$, $p = 0.001$. Additionally, maternal anxiety and maternal EPQ psychoticism together significantly predicted infant Robot RSA augmentation at infant age 8-months, $F(2,35) = 5.00$, $p = 0.01$. These results suggest that infant regulation of novel fear at age 8-months may be dependent on maternal level of psychoticism, anxiety, and negative

affectivity working together, rather than one of 3 traits working independently of each other. The coefficients for the additive effects are displayed in Tables 9 and 10.

Chapter 4

Discussion

The overarching goal of the present study was to assess how maternal personality factors might influence the regulation of fear and frustration in 8- and 12-month-old infants. In doing this, we examined maternal personality constructs that may be instrumental in predicting infant emotion regulation (by playing a role on maternal interpersonal functioning) and used principle component analyses to evaluate these factors using dozens of traits from several different self-report questionnaires. The results are discussed in light of the proposed hypotheses, as well as past research on these topics. Further, limitations and applications of the present study are conferred, as well as future directions of this research topic.

Assessing Maternal Personality Factors

In order to assess how maternal personality traits may predict infant emotion regulation, we first used principle component analyses to pull out personality constructs that may be important to the mother-infant relationship by using dozens of traits from several different scales. This idea of combining several personality traits into fewer factors has been researched for decades and still continues to remain a methodological of many modern-day researchers. One famous example of doing this is McCrae and Costa's Big Five Theory, where it is argued that individuals possess 5 basic personality traits existing on a continuum—neuroticism, extraversion, openness, agreeableness, and extraversion (McCrae & Costa, 1996). Another example is Eysenck and Eysenck's 3 factor theory, which argues that individual possess 3 basic personality traits existing on a continuum—psychoticism, extraversion, and neuroticism, with psychoticism

being the unique component of this theory (Eysenck & Eysenck, 1975). Modern-day researchers further support the importance of utilizing the factor analysis method to combine several personality traits into fewer factors, particularly in an effort to provide an alternative method to the categorical approach of personality disorder diagnoses that the DSM-5 currently uses (e.g., Widiger & Trull, 2007). The methodological goal of this study was to hopefully add to this research base by combining traits from scales that measure certain constructs to pull our 4 distinct personality factors—negative affect, neuroticism, extraversion, and psychoticism—that may be important in parenting and the formation of a secure mother-child relationship.

Results from the principle component analyses showed that we were somewhat successful in achieving this goal. We were able to successfully pull 3 factors for each of the 4 personality constructs of interest (negative affect, neuroticism, extraversion, and psychoticism). However, due to low reliability, we were only able to keep factors for 3 of the constructs. Further, again due to low reliability, we only kept 2 negative affect factors (anxiety and irritability), 1 neuroticism factor (neuroticism), and 2 extraversion factors (positive affectivity and negative affectivity). In addition to adding to the previous research that used factor analyses to identify personality constructs, this study may be instrumental in identifying personality traits that are specific and important to parenting, and in particular, the mother-child attachment relationship. Taken as a whole, these results suggest that mental health and personality questionnaire items can be pulled together to create combined measures of specific personality constructs, with the exception of psychoticism. This approach to assessing personality traits may be important, as it indicates that it can be an effective means of looking at dysfunctional personality traits in a relatively healthy sample, as opposed to just clinical patients.

Maternal Personality and Infant Emotion Regulation

We made several predictions regarding how we expected maternal personality to influence infant RSA reactivity, thus giving insight to how maternal personality relates to infant emotion regulation during fear- and frustration-evoking Lab-TAB tasks. We hypothesized that maternal negative affect, neuroticism, and extraversion would predict infant RSA augmentation (hypotheses 1-3), while maternal psychoticism would not affect infant RSA (hypothesis 4). None of the hypotheses were supported for infant frustration reactivity. However, some significant findings emerged for infant fear regulation.

Hypothesis 1

To begin, our first hypothesis that maternal negative affect would predict infant RSA augmentation was only partially supported. As a reminder, we retained 2 of the 3 negative affect factors from our principle component analyses (anxiety and irritability). The results showed that maternal irritability was positively correlated with infant Stranger Approach RSA at ages 8-months and 12-months, which suggested that as mothers reported higher levels of irritability, infant RSA was augmented. Overall, this finding indicated that infants have more difficulty with regulating social fear when their mothers were more irritable. In contrast, we also found that maternal anxiety was negatively correlated with infant Robot RSA at age 8-months. This suggested that as mothers reported higher levels of anxiety, infants were better able to suppress RSA, which indicated that novel fear regulation is better in infants with more anxious mothers. Previous research has indicated that maternal negative affect makes it more difficult for infants to regulate their emotions (Crockenberg & Leerkes, 2004), but in particular, it appears to inhibit the ability for infants and small children to effectively regulate frustration (Calkins et al., 1998). Our results are somewhat consistent with the previous research and suggests that certain aspects

of maternal negative affect, like irritability, might predict poor infant emotion regulation. On the other hand, our results for maternal anxiety suggest the opposite. Together, these results suggest that there may be differential effects on emotion regulation for different maternal personality traits.

Hypothesis 2

Our second hypothesis that maternal neuroticism would predict infant RSA augmentation was not supported. Our results did not demonstrate any significant associations between our extracted neuroticism factor and infant RSA during any task at any time point. This finding is inconsistent with past research. However, the past research on how maternal neuroticism affects infant emotion regulation has been mostly focused on neuroticism manifesting in the form of BPD (Conroy et al., 2012; Gratz et al., 2014; Kiel et al., 2017). Therefore, our results showing that maternal neuroticism did not affect infant RSA suggests that neuroticism may only play a role in infant emotion regulation when it manifests as BPD (with other traits and symptoms), as opposed to by itself.

Hypothesis 3

Our third hypothesis that extraversion would predict infant RSA augmentation was partially supported. First, the only significant correlation between maternal extraversion and infant RSA was found during the Robot task at infant age 8-months. Second, the only extraversion factor that was significantly correlated with infant RSA was negative affectivity. Specifically, this means that as maternal negative affectivity decreased (i.e., as maternal affect became less negative), infant RSA during the social fear task was augmented, indicating that more positively extraverted mothers predict poor emotion regulation in their infants –the same pattern that we found for maternal irritability. While this finding is consistent with what was

hypothesized regarding extraversion, we only have partial support, as only one extraversion factor was significant during only one fear task at one time point. Nevertheless, this finding may be important to the existing research base on how maternal extraversion plays a role in child development. Past research has been inconsistent in demonstrating how extraversion influences development. It has been proposed that high levels of maternal extraversion are associated with warm and nurturing relationships between mothers and their children, providing appropriate models of emotion regulation (Smith et al., 2007). On the other hand, it has also been demonstrated that high levels of maternal extraversion are associated with higher levels of maternal control. Thus, it may be that it is the high control in mothers that has a negative impact on emotion regulation in children (Clark et al., 2000). Our results support the latter finding, even though more research is still needed to make a solid conclusion.

Interaction and Additive Effects of Maternal Personality on Infant RSA

Because infant RSA during the 8-month Stranger Approach and Robot tasks, as well as the 12-month Stranger Approach task, was correlated with more than one maternal personality factor, we ran multiple regression analyses to test for interaction and additive effects of maternal personality on infant RSA. Although we did not find evidence for significant interactions among maternal personality characteristics, there was evidence of additive effects of maternal personality on infant RSA during the Robot task in 8-month-olds. We found that psychoticism and negative affectivity, as well as psychoticism and anxiety, served as additive effects on infant regulation of novel fear. These results suggested that when psychoticism is combined with either anxiety or negative affectivity, they both account for significant variance in infant RSA.

Specifically, we found that psychoticism and anxiety or negative affectivity were associated with infant RSA augmentation during the Robot task at age 8-months, which indicated that these traits together make it difficult for infants to regulate novel fear at this age. Overall, this indicated that multiple personality traits together are likely to predict infant emotion regulation better than 1 trait independently.

Implications of the Present Research

Overall, the identified associations between maternal personality and infant RSA provide important implications for child developmental outcomes. The present study demonstrated that infants seem to have difficulty with regulating both social and novel fear with increasing levels of maternal negative affect, psychoticism, and extraversion. Previous research has demonstrated that early fear dysregulation predicts childhood internalizing problems, such as anxiety (Buss, 2011; Buss et al., 2013; Rydell et al., 2003) and depression (Rydell et al., 2003). Based on these previous findings, it would not be unreasonable to hypothesize that the infants in our present study who had difficulty with regulating both social and novel fear may be predisposed to developing internalizing disorders later in childhood. Results of the present study suggest that maternal personality does predict infant emotion regulation patterns, so there may be indication that personality or other maternal traits serve as driving factors for poor emotion regulation in infants that might lead to later negative outcomes. Further, it may be that maternal personality predicts the development of a secure mother-infant attachment relationship, which is instrumental in the development of infant emotion regulation (Calkins, 2004). These results, combined with previous findings, may suggest that early interventions that help mothers develop

secure attachment relationships with their infants through personality dysfunction treatments, as well as help infants develop adaptive emotion regulation patterns, may be beneficial in combatting negative developmental outcomes before they start.

Limitations and Future Directions

While the present study offered some interesting and productive findings, it is not without limitations. First, the sample size used in our analyses was relatively small, which limited our ability to detect significant results. Once the current study is adequately powered, these analyses will be repeated.

Another limitation is the use of a relatively healthy sample of mothers. To date, none of the mothers reported clinical levels of psychopathology, and it is likely that psychologically healthy mothers reported minimal levels of dysfunction. Therefore, the findings should be taken in light of the demographic information indicating the psychological health of the mothers in the sample.

With the use of a relatively healthy sample in mind, it should also be noted that mothers typically fill out the self-report questionnaires when their infants are around 4-months-old. Research has demonstrated that some mothers exhibit postpartum anxiety for up to 6-months after the birth of their baby (Paul et al., 2013). The presence of stress and anxiety after having a baby may have influenced maternal responses on some, if not all, of the self-report questionnaires used in the present study. Because the present study did not control for postpartum mental health, there is the possibility that reports on the questionnaires could have been swayed by such.

Further, the measure of psychoticism is relatively unreliable, limiting the application of the association that maternal psychoticism had on infant emotion regulation in the present study. This should be kept in mind when considering the findings. While our findings may be an instrumental step in evaluating the association between maternal psychoticism and infant emotion regulation, perhaps new ways of measuring psychoticism should be explored.

Future research should aim to fix the above limitations by increasing sample size, including a more representative sample, controlling for postpartum mental health in mothers, and exploring new and perhaps more effective means of measuring psychoticism in individuals. Other directions should include further assessing the effects that maternal personality has on child emotion regulation by following up within the overarching longitudinal study. Because the larger longitudinal study collects data on infant participants until they are 2-years-old, it would be beneficial to follow up with the infants at the 18-month and 24-month time points. First this would allow researchers to see whether maternal personality predicts infant emotion regulation more so when infants are older, or if it plays more of a role at younger ages. Assessing the effects of maternal personality on infant emotion regulation throughout the entire duration of the longitudinal study would also provide insight to the stability of and similarities in emotion regulation across the first 2-years of life. Further, it may be interesting to attempt to follow up with the participants into adolescence. Difficulties with emotion regulation may manifest later in life as psychopathology, such as eating disorders (McLaughlin et al., 2011; Sim & Zeman, 2005) and BPD (Gratz et al., 2006). While such a rich longitudinal data set can be difficult to come by, it would be interesting to see if difficulties in emotion regulation during the first 2-years of an individual's life persist into adolescence and adulthood.

Other future studies might consider adding additional personality measures that assess the nature of interpersonal relationships. One example might include the Level of Personality Functioning Scale (LPFS). The LPFS is a 12-item coding method designed to capture the severity of personality dysfunction within intrapersonal and interpersonal relationships (LPFS; APA, 2013). While it was originally designed as a measure to be used by clinicians, research has recently demonstrated the utility and reliability of using the LPFS as a self-report measure (Roche, Jacobson, & Pincus, 2016; Roche, Jacobson, & Phillips, 2018). Further, the self-reports on the LPFS appear to be significantly related to and reliable in predicting other personality variables, such as attachment anxiety and avoidance (Roche et al., 2018). Adding a measure of interpersonal and intrapersonal functioning, such as the LPFS, to a study such as this one may be beneficial in further identifying the strength and security of the mother-infant attachment relationship, which is again important in helping infants develop adaptive emotion regulation (Calkins, 2004).

Conclusion

Despite limitations, the present research provides some interesting insight into how maternal personality predicts infant emotion regulation. Specifically, the present study demonstrated that some maternal factors, like negative affect, psychoticism, and extraversion, influence emotion regulation in infants more so than others, like neuroticism. Additionally, this study proves a starting point for researching how maternal psychoticism influences infant emotion regulation. Further, the present study adds to the previous research base of utilizing factor analyses to filter dozens of traits into specific factors, perhaps setting the scene for

identifying personality factors that are important to parenting specifically. Overall, the present research provides further insight to how infants develop emotion regulation within the context of the attachment relationship that they have with their mothers.

Appendix A

Tables

Table 1. RSA reactivity descriptive statistics.

Task	Stranger Approach		Robot		Arm Restraint	
Age	8M	12M	8M	12M	8M	12M
Min. RSA	-2.62	-1.72	-1.75	-1.82	-3.39	-1.64
Max. RSA	2.93	2.24	2.73	2.36	1.59	1.78
M	0.26	0.31	0.19	0.34	-0.41	-0.20
SD	1.19	0.81	1.02	0.91	1.12	0.74

Note. Descriptive statistics are shown across all 3 tasks in both the 8-month and 12-month old samples. Negative scores indicate RSA suppression (i.e., better regulation), while positive scores indicate RSA augmentation (i.e. difficulty with regulation).

Table 2. Anxiety items, factor loadings, and reliability.

Scale	Item	Loading
PANAS	Upset	0.302
PANAS	Guilty	0.410
PANAS	Scared	0.846
PANAS	Nervous	0.633
PANAS	Jittery	0.381
PANAS	Afraid	0.867
STAI- State	I am presently worrying over possible misfortunes	0.565
STAI- State	I feel frightened	0.593
STAI- State	I feel nervous	0.539
STAI- State	I am worried	0.509
STAI- Trait	I wish I could be as happy as others seem to be	0.364
STAI- Trait	I feel that difficulties are piling up so that I cannot overcome them	0.525
STAI- Trait	I lack self-confidence	0.372
STAI- Trait	Some unimportant thought runs through my mind and bothers me	0.350
BAI	Feeling hot	0.345
BAI	Unable to relax	0.326
BAI	Fear of worst happening	0.660
BAI	Heart pounding or racing	0.541
BAI	Unsteady	0.439
BAI	Terrified or afraid	0.639
BAI	Feeling of choking	0.416
BAI	Fear of losing control	0.369
BAI	Scared	0.697
BAI	Face flushed	0.530
BDI	Mistakes	0.481
EPQ	Would you call yourself a nervous person?	0.310
Cronbach's $\alpha = 0.90$		

Table 3. Irritability items, factor loadings, and reliability.

Scale	Item	Loading
ATQ	I become easily frightened	0.556
ATQ	I rarely feel sad after saying goodbye to friends or relatives	-0.410
ATQ	I seldom become sad when I watch a sad movie	-0.589
ATQ	When I am enclosed in small places such as an elevator, I feel uneasy	0.399
ATQ	Sometimes minor events cause me to feel intense sadness	0.504
ATQ	I'm often bothered by light that is too bright	0.381
ATQ	I seldom become sad when I hear of an unhappy event	-0.442
ATQ	Sometimes I feel a sense of panic or terror for no apparent reason	0.427
ATQ	I usually remain calm without getting frustrated when things are not going smoothly for me	-0.325
ATQ	Loud music is unpleasant to me	0.369
ATQ	Loud noises sometimes scare me	0.468
ATQ	When I hear of an unhappy event, I immediately feel sad	0.531
ATQ	It does not frighten me if I think that I am alone and suddenly discover someone	-0.338
PANAS	Scared	-0.356
STAI- State	I am jittery	-0.349
STAI- Trait	I feel nervous and restless	0.426
STAI- Trait	I worry too much over something that doesn't really matter	0.313
BAI	Feeling hot	0.463
BAI	Unable to relax	0.362
BAI	Nervous	0.309
EPQ	Are you easily hurt?	0.408
EPQ	Would you call yourself a nervous person?	0.418
EPQ	Are you a worrier?	0.512
EPQ	Would you call yourself tense or highly strung?	0.506
EPQ	Do you worry too long after an embarrassing experience?	0.517
EPQ	Do you suffer from nerves?	0.486
EPQ	Are you often troubled by feelings of guilt?	0.317
Cronbach's $\alpha = 0.63$		

Table 4. Positive affectivity items, factor loadings, and reliability.

Scale	Item	Loading
ATQ	It doesn't take much to evoke a happy response in me	0.317
PANAS	Interested	0.729
PANAS	Excited	0.728
PANAS	Strong	0.582
PANAS	Enthusiastic	0.783
PANAS	Proud	0.694
PANAS	Alert	0.599
PANAS	Inspired	0.719
PANAS	Determined	0.769
PANAS	Attentive	0.815
PANAS	Active	0.617
Cronbach's $\alpha = 0.85$		

Table 5. Negative affectivity items, factor loadings, and reliability.

Scale	Item	Loading
PANAS	Distressed	0.534
PANAS	Upset	0.615
PANAS	Guilty	0.694
PANAS	Scared	0.729
PANAS	Irritable	0.672
PANAS	Ashamed	0.401
PANAS	Nervous	0.666
PANAS	Jittery	0.527
PANAS	Afraid	0.751
Cronbach's $\alpha = 0.82$		

Table 6. Neuroticism items, factor loadings, and reliability.

Scale	Item	Loading
ATQ	I become easily frightened	0.526
ATQ	I am often late for appointments	0.352
ATQ	I would not enjoy the sensation of listening to loud music with a laser light show	0.318
ATQ	I usually like to talk a lot	0.351
ATQ	I seldom become sad when I watch a sad movie	-0.366
ATQ	I sometimes seem to understand things intuitively	0.366
ATQ	Sometimes minor events cause me to feel intense sadness	0.342
ATQ	I rarely ever have days where I don't at least experience brief moments of intense happiness	0.72
ATQ	I sometimes feel sad for longer than an hour	0.337
ATQ	Sometimes, I feel a sense of panic or terror for no apparent reason	0.415
ATQ	I often feel sad	0.51
ATQ	I usually remain calm without getting frustrated when things are not going smoothly for me	0.381
ATQ	I would enjoy watching a laser light show with lots of bright, colorful, flashing lights.	-0.33
ATQ	When I hear of an unhappy event, I immediately feel sad	0.408
ATQ	When I watch a movie, I usually don't notice how the setting is used to convey the mood of the characters	0.367
PANAS	Distressed	-0.351
PANAS	Scared	0.332
PANAS	Nervous	-0.318
PANAS	Jittery	0.413
PANAS	Afraid	0.452
STAI- State	I am presently worrying over possible misfortunes	0.577
STAI- State	I feel nervous	0.611
STAI- State	I feel indecisive	0.47
STAI- State	I am worried	0.387
STAI- Trait	I feel nervous and restless	0.388
STAI- Trait	I feel rested	0.358
STAI- Trait	I feel that difficulties are piling up so that I cannot overcome them	0.451
STAI- Trait	I worry too much over something that doesn't really matter	0.346
STAI- Trait	I have disturbing thoughts	0.565
STAI- Trait	I lack self-confidence	0.319
STAI- Trait	I feel inadequate	0.552

STAI- Trait	Some unimportant thought runs through my mind and bothers me	0.557
STAI- Trait	I take disappointments so keenly that I can't put them out of my mind	0.385
STAI- Trait	I get in a state of turmoil as I think over my recent concerns and interests	0.605
BDI	Mistakes	0.333
BAI	Unable to relax	0.556
BAI	Fear of worst happening	0.642
BAI	Terrified or afraid	0.699
BAI	Nervous	0.588
BAI	Fear of losing control	0.502
BAI	Scared	0.541
EPQ	Are you easily hurt?	0.556
EPQ	Would you call yourself a nervous person?	0.453
EPQ	Are you a worrier?	0.572
EPQ	Would you call yourself tense or highly strung?	0.471
EPQ	Do you worry too long after and embarrassing experience?	0.375
EPQ	Do you suffer from nerves?	0.496
EPQ	Do you feel lonely?	0.531
EPQ	Are you often troubled by feelings of guilt?	0.389
Cronbach's $\alpha = 0.84$		

Table 7. EPQ psychoticism items and subscale reliability.

Do you take much notice of what people think?
Would being in debt worry you?
Would you take drugs which may have strange or dangerous effects?
Do you prefer to go your own way rather than act by the rules?
Do good manners and cleanliness matter much to you?
Do you think marriage is old fashioned and should be done away with?
Do you enjoy co-operating with others?
Does it worry you if you know that there are mistakes in your work?
Do you think people spend too much time safeguarding their future savings and insurance?
Do you try not to be rude to people?
Would you like other people to be afraid of you?
Is it better to follow society's rules than your own way?
Cronbach's $\alpha = 0.50$

Table 8. Correlations between maternal personality and infant RSA.

	8M Stranger Approach	8M Robot	8M Arm Restraint	12M Stranger Approach	12M Robot	12M Arm Restraint
Anxiety	.09	**-.29***	-.008	-.08	.09	-.19
Irritability	**.31***	.18	.13	**.31***	.09	-.19
Positive Affectivity	-.12	-.04	-.18	.08	.13	.17
Negative Affectivity	-.13	**-.37****	-.09	-.19	-.19	-.21
Neuroticism	.16	-.05	.06	.10	.09	-.23
EPQ Psychoticism	**.27***	.26	.16	**.28***	-.007	-.08

Note. Correlation coefficients (*r*) between maternal personality constructs and infant RSA. *indicates that the correlation is approaching significance ($p < 0.10$). **indicates that the correlation is significant ($p < 0.05$). Significance is reported at the two-tailed level.

Table 9. Coefficients showing additive effects of maternal negative affectivity and EPQ psychoticism on infant 8M Robot RSA.

Model		*B*	*SE B*	*β*	*t*	*p**
1	8M Robot RSA	0.35	0.14		2.59	**0.014**
	Negative Affectivity	-0.60	0.17	-0.54	-3.63	**0.001**
	EPQ Psychoticism	0.24	0.08	0.46	3.13	**0.003**
2	8M Robot RSA	0.40	0.15		2.69	**0.011**
	Negative Affectivity	-0.57	0.17	-0.51	-3.32	**0.002**
	EPQ Psychoticism	0.21	0.08	0.41	2.53	**0.016**
	Negative Affectivity x Psychoticism	-0.07	0.09	-0.12	-0.80	0.427

Note. **p* is significant at < 0.05.

Table 10. Coefficients showing additive effects of maternal anxiety and EPQ psychoticism on infant 8M Robot RSA.

Model		*B*	*SE B*	*β*	*t*	*p*∗
1	8M Robot RSA	0.26	0.15		1.74	**0.091**
	Anxiety	-0.43	0.19	-0.35	-2.30	**0.028**
	EPQ Psychoticism	0.18	0.07	0.37	2.48	**0.018**
2	8M Robot RSA	0.29	0.15		1.94	0.060
	Anxiety	-0.46	0.19	-0.37	-2.46	**0.019**
	EPQ Psychoticism	0.12	0.09	0.24	2.53	0.192
	Anxiety x Psychoticism	-0.17	0.12	-0.25	-1.41	0.168

Note. *p is significant at < 0.05.

Appendix B

Footnotes

[1]RSA data collection also occurs at the 18-month-old and 24-month-old visits, but as the larger longitudinal study has ongoing data collection, large enough sample sizes at the later visits are not available, explaining why only infant data from the 8-month-old and 12-month old visits were used in the present study.

[2]While the majority of mothers completed the questionnaires at infant age 4-months, there were some dyads in the sample that did not begin the study until the second wave at infant age 8-months. These mothers completed the personality inventories at infant age 8-months.

[3]Due to no variability within responses (i.e., all participants reported “0”), BDI item 9 (Suicidality) had to be excluded from all of the principle component analyses for each of the 4 constructs. This is the only exception to using all items from all questionnaires.

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