LIKE MOTHER, LIKE CHILD: INTERGENERATIONAL TRANSMISSION OF MATERNAL EMOTION REGULATION TO SIX-MONTH INFANTS

by

ANNALIESE ELLIOT

A THESIS

Presented to the Department of Psychology
and the Robert D. Clark Honors College
in partial fulfillment of the requirements for the degree of
Bachelor of Arts

May 2022

An Abstract of the Thesis of

Annaliese Elliot for the degree of Bachelor of Arts
in the Department of Psychology to be taken May 2022

Title: Like mother, like child: Intergenerational transmission of maternal emotion regulation to six-month infants

Approved: *Jennifer Ablow, Ph.D.*
Primary Thesis Advisor

Previous research demonstrates how maternal psychopathology is associated with negative infant outcomes; however, there is minimal research on intergenerational transmission. Specifically, there is a lack of literature on intergenerational transmission of emotion dysregulation. Emotion dysregulation has been demonstrated as a precursor to future psychopathology in childhood and adulthood; therefore, infancy is a crucial time period to develop self-regulatory skills. This study aims to build upon previous research to further understand how maternal emotion dysregulation predicts poor infant regulation. This study examines the predictive association among maternal emotional dysregulation reported prenatally during the third trimester and postnatally at six months, using the Difficulties in Emotion Regulation Scale (DERS), and observations of infant self-regulation postnatally (N = 221). Temperament, measured with the Infant Behavioral Questionnaire (IBQ-R), was controlled to capture the independent contributions of maternal dysregulation to infant's early indices of emotion regulatory capacities. Infants' self-regulation and negative affect was measured at 6 months postpartum with micro-analytic behavioral coding during the Still Face Paradigm (SFP), a widely used paradigm to examine early relationship patterns between caregivers and their infants. Although association between prenatal reports of maternal emotion regulation was not significantly related to infants' emerging regulatory capacities, maternal reports of concurrent dysregulation at 6-months postpartum was associated with poorer self-regulation in their infants. This finding suggests that emotion dysregulation can be transmitted across generations by postpartum mother-child interaction influences.

Acknowledgements

I would like to thank Dr. Jennifer Ablow, my Primary Thesis Advisor, for helping me to examine associations between maternal emotion regulation and infant self-regulation in this thesis. I have had the honor to work with her in the Developmental Sociobiology Lab here at the University of Oregon for over a year now. Dr. Ablow's lab has been working on the Prenatal Environment and Child Health (PEACH) Study from which I obtained the data for this thesis. I have loved being a part of this project and appreciate the contributions of the DSL's research team. The PEACH study is a larger, longitudinal study based at the Oregon Health and Science University, so I would also like to extend my gratitude to the research team there and, specifically, the primary investigators Dr. Elinor Sullivan, Dr. Joel Nigg, and Dr. Hanna Gustafsson.

I would also like to thank the other members of my Thesis Committee including my Second Reader, Dr. Jeffrey Measelle, who helped me greatly in the data analysis process, as well as my CHC Representative, Dr. Carol Paty for her guidance and support in this process. I have been fortunate to receive guidance from them and Dr. Ablow in this strenuous but rewarding process. I would also like to thank my family for their continuous support and encouragement in all my education. I specifically want to thank my older sister, Alexa, for editing many thesis drafts and being someone to turn to during this challenging process. Lastly, I would like to acknowledge the mothers and infants who participated in this study and made it possible to conduct this research.

Table of Contents

List of Tables

Introduction

The inability to regulate or control one's emotions, or emotion dysregulation, is a demonstrated precursor to future psychopathology (Bridgett, Burt, Edwards, & Deater-Deckard, 2015). Development of these important regulatory capacities begins in infancy. Therefore, infancy is a crucial time period to examine self-regulatory skills that could have longer, even lifetime, implications. Previous research demonstrates how maternal psychopathology is associated with negative infant outcomes, however there is a lack of research on the transmission of maternal emotion dysregulation (Bush et al., 2017; Davis, Glynn, Waffarn, & Sandman, 2011; Korja, Nolvi, Grant, & McMahon, 2017; Thomas et al., 2017). This study aims to build upon previous research to further understand how maternal emotion dysregulation predicts poor infant regulation by examining the predictive association between reported maternal emotional dysregulation with observations of infant self-regulation. Understanding how a pregnant woman's dysregulation relates to her infant's developing regulatory strategies may provide insight into specific mechanisms through which risk for emotion dysregulation is transmitted across generations. From there, targeted interventions can be made to support the development of adequate self-regulation skills in infants.

Emotion regulation

Emotion regulation is characterized by attempts to control, suppress, re-evaluate, or amplify emotions in relation to personal goals such as socially appropriate behavior (Beauchanine, 2015; Crowell, Vlisides-Henry, & Kaliush, 2019; Fernandez, Jazaieri, & Gross, 2016). The ability to regulate one's emotions is adaptive, allowing for effective communication, learning, and the preservation of important social relationships.

Sheppes, Suri, & Gross (2015) outline a theoretical model of emotion regulation as (1) identifying the emotion, (2) selecting a regulatory strategy, (3) implementing the strategy, and (4) monitoring the strategy and adjusting it as needed. Thus, emotion dysregulation is when one has difficulties in any of the outlined steps and fails to adequately regulate their emotions (Cole, Dennis, Martin, & Hall, 2008; Fernandez, Jazaieri, & Gross, 2016). Emotion dysregulation is characterized by patterns of emotional experience and expression that are overly intense, unstable, rigid, or prolonged that ultimately impede appropriate behavior (Crowell, Vlisides-Henry, & Kaliush, 2019). Emotion dysregulation can result in issues such as poor communication that negatively affects one's relationships and overall well-being.

Emotion regulation starts early in life and is a vital skill to develop. However, infant emotion regulation is very different from emotion regulation as an adult. Infants largely learn and develop emotion regulation abilities in the context of a social partner, which is typically in the form of a primary caregiver (Thompson & Goodman, 2010). A caregiver helps an infant co-regulate; for instance, if one's baby is distressed and crying, the caregiver may hold and rock the infant to soothe and calm them. Infants can also self-regulate in order to resolve physiological experiences of stress and distress. One way infants can regulate is through self-soothing strategies such as sucking or self-clasping, which have been found to reduce distress and frustration (Thomas et al., 2017). Additionally, infants can "distract" themselves from their distress by using exploratory strategies or disengaging from stressful stimuli. They continue to learn and develop these self-regulatory skills throughout childhood and adolescence (Beauchanine, 2015). Because emotion regulation is largely socialized, infants rely on caregivers to aid in physiological and behavioral regulation before they can do so independently (Propper et al., 2008). These strategies are beneficial to overall development because self-regulation aids in emotional regulation.

Support from a social partner is crucial in the development of self-regulation skills. For instance, previous studies have demonstrated that poor parenting strategies, such as low warmth, can negatively reinforce self-regulation difficulties in infants, which may underlie development of later behavioral or emotional problems (Beauchanine, 2015; Crowell, Vlisides-Henry, & Kaliush, 2019). Infants whose caregivers properly support emotion regulation tend to have better self-regulation abilities. Conversely, infants who have an inattentive caregiver, possibly due to forms of psychopathology such as depression, have less support and therefore, are at higher risk of developing poor self-regulation skills (Crowell, Vlisides-Henry, & Kaliush, 2019).

The Still Face Paradigm

The Still Face Paradigm (SFP) is a widely used paradigm that mimics a situation where a caregiver is unavailable to attend to their infant, often resulting in infant distress, and in turn, infant self-regulation. The SFP begins with a baseline of normal play between the mother and infant. Next is the Still Face Episode, in which the mother stares at the infant with an unresponsive, blank face. This breaks the infant's expectations of their caregiver being responsive to emotional or communication bids, typically resulting in a negative response from infants and attempts to self-regulate (Mesmen, van Ijzendoom, & Bakermans-Kranenburg, 2009; Tronick, Als, Adamson, Wise, & Brazelton, 1978). Lastly, in the Reunion Episode the mother becomes responsive again and engages in normal play. The SFP creates a stressful situation that forces infants to use their coping capabilities when a parent is unavailable to aid in emotional regulation.

Typically, infants use cues like facial expression, crying, tone, and gestures to demonstrate distress to caregivers who are then expected to respond to the infants' needs (Cole, Martin, & Dennis, 2004; Thomas et al., 2017; Tronick, Als, Adamson, Wise, & Brazelton, 1978). Appropriate, sensitive caregiver response to infant cues supports the development of self-regulation skills that are necessary when a caregiver is unavailable, such as during the Still Face Episode of the SFP (Conradt & Ablow, 2010). The use of self-regulatory actions, such as self-grasping, sucking, or diverting attention from the stressful stimuli, aids in reducing the infant's expression of negative affect (Maclean et al., 2014; Tronick, Als, Adamson, Wise & Brazelton, 1978). This demonstrates the positive effect of self-regulation on overall emotion regulation. Overall, the Still Face Paradigm has led to extensive research on how infants cope in stressful situations, highlighting the effectiveness of self-regulation strategies (Thomas et al., 2017).

In previous research, the SFP has been used to demonstrate meaningful differences in how infants attempt to manage stress when there is an unresponsive caregiver. One factor that leads to variation in infant responses and regulation is infants' experience with caregiver sensitivity or caregiver responsiveness (Mesmen, van Ijzendoom, & Bakermans-Kranenburg, 2009). For instance, Kogan & Karter (1996) found that infants of sensitive mothers used more interpersonal regulation during recovery while infants of less sensitive mothers were more likely to use avoidant and resistant types of regulation during the Reunion Episode. This indicates that infants of less responsive mothers are more likely to be self-reliant for emotional regulation. The authors interpreted that these infants may be used to their mothers not responding effectively to their cues of distress. Contrarily, infants of responsive mothers were found to benefit from positive interactions that strengthen the development of self-regulation skills (Kogan & Karter, 1996).

The SFP has also demonstrated meaningful differences in Respiratory Sinus Arrhythmia (RSA), which indicates emotion regulation abilities by estimating parasympathetic effect on heart rate (Ham & Tronick, 2006). Studies have indicated that infants who are able to recover from the Still Face Episode usually have large increases in RSA during the Reunion Episode, demonstrating higher emotion regulation (Kogan & Carter, 1996). In a study using the SFP, it was found that higher maternal sensitivity during the Reunion Episode resulted in decreased heart rate and increased RSA, indicating effective emotional regulation (Conradt & Ablow, 2010; Propper et al., 2008). Additionally, infants of less responsive mothers had higher heart rates and lower RSA, which supports the similar effects found in the Mesmen, van Ijzendoom, and Bakermans-Kranenbur's study (2009). Overall, these findings demonstrate the necessity of both self-regulation and the use of caregivers for comfort when infants are in distress.

Intergenerational transmission of emotional regulator difficulties

Intergenerational transmission is the transmission of traits from a parent to their child. It occurs by different pathways, such as a biological transmission in utero or an environmental transmission postnatally through parent-child interactions (Thompson & Goodman, 2010). In past research, associations have been demonstrated between maternal psychopathology and infant self-regulatory abilities. Findings indicate that depressed mothers are more likely to have infants who use self-soothing strategies rather than attentional strategies to self-regulate (Manian & Bornstein, 2009; Warnock et al., 2016). Additionally, infants of depressed mothers who attempted gaze aversion were more likely to revert to negative behaviors during the SFP, indicating a failure to regulate emotionally. Similar findings have been demonstrated in infants of mothers with high pregnancy anxiety or higher stressful life events and poor self-regulation in their infants (Bush et al., 2017; Davis, Glynn, Waffarn, & Sandman, 2011; Korja, Nolvi, Grant, & McMahon, 2017; Thomas et al., 2017). However, Thomas et al. (2017) found that higher maternal sensitivity mitigated these results, suggesting that both prenatal exposure and postpartum caregiving influence infant regulatory capacities. Therefore, interventions supporting maternal warmth and sensitivity could reduce the poor self-regulation in infants (Conradt & Ablow, 2010).

Furthermore, it has been demonstrated that stress hormones in mothers can influence infant socioemotional development during infancy (Korja, Nolvi, Grant, & McMahon, 2017). Bush et al. (2017) found associations among maternal reports of stressful life events, perceived stress, and self-regulation in their infants. Overall, there was lower self-regulation and higher RSA during the Still Face Paradigm in infants whose mothers had higher stress. These findings suggest an intergenerational transmission of the regulatory effects of adversity through biological mechanisms (stressful life events preceding giving birth) as well as possible environmental effects by measuring perceived stress postnatally as well as gestationally.

Binion and Zalewski (2018) studied preschoolers performing the Locked Box Task, which is designed to elicit anger and frustration. They found that maternal emotion dysregulation was associated with less talk, higher distraction, and less problem solving in children, which are all indicators of poor self-regulation that interfered with the task. This indicates an environmental transmission of emotion regulation. However, one issue the study discusses is bidirectionality. Binion and Zalewski note that temperament, or individual differences in behavior that are believed to be biologically based, has been suggested as another contributor to emotion regulation abilities. Therefore, the study was unable to conclude whether mothers' poor emotion regulation impacted children's poor self-regulation, or if children with difficult temperament worsened emotion dysregulation in mothers.

In a study investigating maternal emotion dysregulation in association to infant neurobehavior, Ostlund et al. (2019) found that women who reported higher emotion dysregulation prenatally had newborns with low attention and arousal. The study suggests that the low attention and arousal found in these infants may be for an adaptive reason: low reactivity would allow infants to more easily cope with an unresponsive parent. These findings were the first evidence of an association between maternal prenatal emotion dysregulation and dysregulation in newborns, supporting the idea of intergenerational transmission with potential prenatal routes of transmission, or transmission via biological factors. By examining the predictive association of maternal emotion dysregulation and infant self-regulation, the current study is looking to build upon these findings by Ostlund et al. (2019), aiming to further understand the mechanisms of the intergenerational transmission of emotion regulation. Overall, infancy is a crucial period for development of emotional health. Studying this time can help us further understand what leads to typical and atypical development and allow for clinicians to identify infants at risk, work on prevention, and help provide interventions (Cole, Martin, & Dennis, 2004; Cole, Dennis, Martin, & Hall, 2008).

Current study

My thesis will be examining the specific question: Does prenatal perceived emotion dysregulation in expectant women predict poor self-regulation capacities in their infants over and above the effect of infant temperament? Infant temperament is being addressed because it is an additional factor shown to be related to emotion regulation (Binion & Zaleweksi, 2019). The thesis will discuss further implications of the study results by asking: Is emotion dysregulation transferred intergenerationally from mothers to infants? It is hypothesized higher reports of maternal perceived prenatal emotion dysregulation will be associated with infants utilizing less effective regulatory actions during the Still Face Episode of the SFP over and above the effect of maternal reported infant temperament. This study expanding upon the findings of Ostlund et al. (2019), which demonstrated the first evidence of intergenerational transmission of emotion dysregulation to newborns by examining the association between prenatal and postnatal emotion regulation in mothers and self-regulation in their six-month infants.

Method

Participants

Participants for this study were recruited from Oregon Health & Science University's prenatal clinics and using PEACH study recruitment materials. Medical records were assessed to determine eligibility. All pregnant women between the ages of 18-40 who were in good health were deemed eligible for the study. 50.4% of the infants were female. In total, 266 pregnant women participated in the study with the mean age of 32.82 (*SD* = 4.13, range = 18.48 - 40.99). Upon entrance to the study, the mean highest school grade of completion for mothers was 16.13 (*SD* = 2.50, range = 9 - 20), or four years of college. 81.6% of the women were married and living with their spouse. 76.7% of mothers were white or Middle Eastern, 2.3% African American, 5.3% Hispanic, 1.5% American Indian or Alaska Native, 10.9% Asian, 2.3% Native Hawaiian or Pacific Islander, and 3.4% reported themselves as another group. Mother and infant demographics are reported in Table 1. below.

Table 1. *Sample Characteristics*

Infant	**%**		
Sex, % Female	50.4		
Racial Group / Ethnicity			
Hispanic	1.9		
American Indian / Alaska Native	1.9		
Asian / East Indian	13.2		
Native Hawaiian / Pacific Islander	2.3		
Black / African American	4.5		
White / Middle Eastern	78.9		
Other	4.5		

Mother	Mean or %	SD	Range
Age, years	32.82	4.13	18.48 – 40.99
Highest grade of regular school completed	16.13	2.50	9 – 20
Racial Group / Ethnicity			
Hispanic	5.30		
American Indian / Alaska Native	1.50		
Native Hawaiian / Pacific Islander	2.30		
Black / African American	2.30		
White / Middle Eastern	76.70		
Other	3.40		
Relationship Status			
Never been married	7.1		
Married, living with spouse	81.6		
Married, separated from spouse	0.8		
Divorced	2.6		
Other	2.3		

Procedure

The present study is part of a larger, longitudinal project investigating links between maternal prenatal health and infant neurodevelopmental outcomes at Oregon

Health & Science University. Because of the inclusion of pregnant women and children in this study, informed written consent was obtained and all procedures were approved and overseen by the Institute Review Board of OHSU. Verbal consent was also required for the virtual study visits (see further explanation below). For the current study, mothers' emotional regulation was assessed prenatally during their third trimester of pregnancy with a self-report questionnaire, specifically the Difficulties with Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) as well as at six months postpartum. Prior to the onset of the COVID-19 pandemic, participants visited the laboratory located at OHSU. However, due to the onset of the pandemic, from February 2020 – June 2020, laboratory visits were adapted to remote data collection with the use of Zoom. Starting in June 2020, participants were offered the choice of remote data collection or a visit to the laboratory. Therefore, for the postnatal data collection, in which mothers engaged in the Still Face Paradigm (SFP; Tronick, Als, Adamson, Wise & Brazelton, 1978) with their infants at six months postpartum, families were invited to participate in tasks in the laboratory playroom at OHSU (N = 69) or in their homes remotely over Zoom (N = 152). Video recordings of the SFP interactions were coded at the University of Oregon (see description below). Participants were appropriately compensated for their time.

Measures

Maternal emotion dysregulation. Maternal emotion dysregulation was analyzed using the Difficulties with Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS is a reliable and valid 36 item scale that asks participants to rate how statements concerning emotions relate to them on a scale from 1-5 in which 1 represents almost never (0%-10% of the time) and 5 indicates almost always (91%-

100% of the time). Some of the statements included are “I have difficulty making sense of my feelings” and “When I’m upset, I start to feel very bad about myself.” A higher total DERS score represents higher emotional dysregulation; a score of 70 reflects “nonclinical community average” and a score of 96 is “clinically significant emotion dysregulation” (Binion & Zalewski, 2018). 7.8% of the prenatal sample and 4.8% of the postnatal sample was above the clinical cutoff.

Infant temperament. Infant temperament was assessed by mothers completing the Revised Infant Behavior Questionnaire (IBQ-R; Gartstein & Rothbart, 2003) when infants were 6 months old. The IBQ-R is a widely used measure that has 14 total scales. For the present study, individual scales were analyzed and a Negative Affect composite score (M = 3.00) was created. The individual scales for the composite were Sadness, Distress to Limitations (to what extent the infant shows distress in confining situations or when unable to perform a desired action), Fear, and Rate of Recovery. A Self-Regulation composite score (M = 5.10) also was used to determine self-regulation. Overall, the questionnaire has 191 items based on concrete actions that mothers rate on a scale of one (never occurs) to seven (always occurs). The scores for each scale are summed up individually; therefore, the higher a score on a specific scale indicates greater temperament in that dimension.

Infant self-regulation and negative affect. Infant self-regulation and negative affect was derived from micro-analytic behavioral codes obtained during the Still Face Paradigm (SFP; Tronick, Als, Adamson, Wise & Brazelton, 1978). The SFP is a well-established procedure that is designed to mimic situations in which caregivers are unable to attend to infants. Typically, the paradigm elicits distress and self-regulation in infants. The SFP starts with a baseline interaction of the mother and infant playing peekaboo for two minutes. The mother then turns away for 15 seconds and returns to her child for the Still Face Episode, in which she maintains a blank face for two minutes. The mother turns away for 15 seconds again, then returns and plays with her infant as she normally would for two minutes in a Reunion Episode. Only the Still Face Episode was used for analysis since it typically results in negative reactions that can be soothed with self-regulation. The SFP was recorded and later coded in five second epochs (see description below).

Data coding

Infant emotional expressions and regulation were coded by a team of coders during the Still Face Paradigm, using a modified version of a developed coding scheme further discussed below (Holochwost, Gariepy, Proper, & Mills-Koonce, 2014; Moore et al., 2009). All sections of the paradigm, including the baseline, Still Face Episode, and Reunion Episode were coded, but for this study, only the Still Face Episode was examined. All codes were made in time-synchronized five second epochs using Noldus software.

Emotional expressions. Infant emotion expressions were coded using a modified version of a published coding scheme (Holochwost Gariepy, Proper, & Mills-Koonce, 2014; Moore et al., 2009). Facial, bodily, and vocalization affect were coded in five second epochs.

Facial expression coding options included neutral, facial joy, or facial distress. A neutral face was defined by no clear emotional expression. Facial joy was rated on a scale from one to three, with one being defined as a small smile with no involvement of other facial areas and three being defined as a large smile with stretch lips, bulged cheeks, and crinkled eyes. Facial distress was also rated on a scale from one to three. It includes expressions of sadness, anger, and frustration, with one being defined as distress only in one facial region and a three being defined as strong distress appearing in three regions of the face. If either distress or joy was detected, the expressed emotion was coded above the neutral face no matter how long it lasted during the 5 second epoch.

Bodily codes were determined on presence of bodily distress, presence of bodily joy, or a neutral body. Unlike the facial expressions, bodily codes were only coded for presence and not for intensity on a scale. Neutral body was coded when the body was relaxed and unemotional. Bodily joy was coded when there was a distinct increase in activity level, pointing or reaching at the mother, or actions such as clapping or bouncing. Bodily distress included signs of anger, sadness, or frustration. This included actions such as trying to escape the chair, tensing of the body, or kicking/hitting that was not rhythmic.

Vocal expressions were coded either as positive or distress, with neutral sounds being included in the positive codes. Distress vocalizations were mainly coded in conjunction with visible facial or bodily distress. Both types of vocalizations were coded on a scale of one to three, with distress one representing short and low intensity protest of whining/whimpering and distress three representing high intensity crying that lasted most of the epoch. For positive vocalizations, a score of one indicated a short, low intensity positive or neutral sound and a score of three representing high intensity talking/laughing for a long duration. The coding levels are presented in Table 2.

Table 2. *Cues Used for Emotional Coding*

Expression	Emotion	Level Cues
Facial Affect	Joy	1. Small smile with no involvement of other facial areas
		2. Medium smile with slight bulge of cheeks and perhaps mouth open and/or crinkling around the eyes
		3. Large smile with stretch lips, bulged cheeks, crinkled eyes, and perhaps mouth open
	Distress	1. Low intensity distress expressed only in one facial region
		2. Distress expressed in two facial regions
		3. Impression of strong distress or distress appearing in three regions of the face

Bodily Affect	Presence of Joy	0. No sign of bodily joy
		1. Distinct increase in activity level, pointing or reaching at the mother, or actions such as clapping or bouncing
	Presence of Distress	0. No sign of bodily distress
		1. Signs of anger, sadness, or frustration. Trying to escape the chair, tensing of the body, or kicking/hitting
Vocalization	Positive	1. Short, low intensity positive or neutral sound
		2. Intermittent giggling, talking, or babbling. Lower intensity and duration
		3. High intensity talking/laughing for a long duration
	Negative	1. Short and low intensity protest of whining/whimpering
		2. Definite protest of moderate intensity
		3. High intensity crying for a long duration

Regulatory actions. Regulatory actions were coded using the same developed system. Regulatory behavior also was coded in five second epochs. If more than one action occurred in one epoch, the one with a longer duration was coded. The actions were:

Self-regulation (SR 1): evidence of infant behaviors to self soothe, such as actively mouthing or touching an object with an averted gaze. This could include sucking on a body part or object, pulling on clothes, rhythmic movements, or wringing hands together.

Exploration (SR 2): infants are actively touching and gazing at an object, such as their own body part or the chair.

Attention seeking (SR 3): infant is trying to get the caregiver's attention. The infant's gaze must be on the caregiver's face, and there must be an exaggerated expression, movement, or vocalization.

Interrater agreement. There were four different coders for the SFP. Coders were trained to accomplish 80% agreement with a master coder. Once trained, continued interrater reliability was assessed throughout all videos coded to avoid coding drift and was determined on 25% randomly assigned videos. Percent agreement was calculated and resulted in averages of 84.95% agreement for facial expression, 84.95% agreement for bodily expression, 81.78% agreement for vocalization, and 82.20% for self-regulation. This demonstrates excellent agreement for all categories.

Missing Data. Because the task elicits distress, some infants were unable to complete the entire SFP. Additionally, some mothers did not follow the task protocol and took their infants out of the chair, causing the task to end early. There were eight videos with a short SF period and 20 videos with a recovery period significantly shorter than the normal two minutes. There were 12 videos missing the turnaround 2 section and two videos with no recovery. All of these videos were still used in the analyses.

Prior to conducting the central analyses for this thesis, families with no missing data were compared with families with any missing data using analysis of variance procedures (ANOVA). On the study's primary demographic, infant, and maternal data, there were no statistically significant mean level differences between families with and without missing data (F's ranged from 0.001 to 1.72, p's ranged from 0.97 to 0.19, respectively). 69.5% of the original sample was used in the final analyses (N = 185).

Data analysis plan

Statistical analyses were conducted using SPSS Version 28. Means, standard deviations, and proportions were used to characterize the sample for descriptive purposes. Bivariate correlations were used to study associations between the variables and to limit the number of covariates included in the final analysis models. Multiple regression analyses were used for the main analysis of the data. Regressions were run with predictors entered hierarchically. For each form of self-regulation, three models of increasing complexity were tested. Model 1 included the IBQ Negative Composite scores, the IBQ Regulation Composite scores, and infants' Total Distress score during the Still Face Episode. The prenatal DERS completed during the participant's third trimester of pregnancy was added into Model 2, and the postnatal DERS completed at 6 months postpartum was added into Model 3. For each model, unstandardized estimates (β), their standard errors (SE β), t values, and 95% confidence intervals are displayed to help analyze the unique contributions of each predictor.

Results

Preliminary analysis

Descriptive statistics are presented in Table 3. For the infants, this included IBQ-R scores for the Negative Affect composite (M = 3.00, SD = 0.59) as well as the Self-Regulation composite (M = 5.10, SD = 0.51). Additionally, descriptive statistics of data collected during the SFP, including negative distress, broken down by the type of distress shown (e.g., bodily, vocal, and facial) as well as the different types of self-regulation exhibited by infants, are displayed in Table 3. In terms of infant's distress during the SFP, the data in Table 3 suggests that a majority of infants showed distress in all three modalities. Similarly, it was found that 98.5% of infants used at least some form of self-regulation during this period. Mothers' prenatal DERS (M = 65.69, SD = 17.53) and postnatal DERS (M = 62.82, SD = 17.96) are reported as well as the percentage of mothers above a clinical cutoff for emotion dysregulation, which was 7.8% during the third trimester and 4.8% at six months postpartum. The variation within the descriptive statistics necessitated further testing to decide what was important for final analyses.

Intercorrelations were tested before the regression models to examine the associations between predictor and outcome variables, which are presented in Table 4. Expected significant negative associations were found between Self-Regulation (SR) 0 (no visible regulation) and SR 1 (self-soothing regulation), $r(221) = -0.53$, $p < 0.001$, SR 0 and SR 2 (exploratory regulation), $r(221) = -0.52$, $p < 0.001$, and between SR 0 and SR 3 (attention seeking regulation), $r(221) = -0.15$, $p = 0.02$. All of these were negative associations, indicating that as infants spent more time not regulating, other forms of regulation decreased. It is interesting to note that the correlation coefficient (r) was much smaller between SR 0 and SR 3 in comparison to the other types of regulation, meaning it was a weak association. Similarly, there were statistically significant negative correlations between SR 1 (self-soothing regulation) and SR 2 (exploratory regulation), $r(221) = -0.33$, $p < 0.001$ as well as SR 1 and SR 3, $r(221) = -0.22$, $p < 0.001$; however, both associations were fairly small. This means as self-soothing regulation increased, other forms of regulation decreased. There was a significant negative association found between IBQ-R composite scores for Negative Affect and Regulation, $r(262) = -0.25$, $p < 0.001$, indicating that higher scores of Negative Affect were correlated with lower scores of Self-Regulation.

There were also associations found with the DERS, or scores for maternal emotion regulation, at both time points. At the third trimester, the DERS was associated with the IBQ-R for Negative Affect, $r(232) = 0.23$, $p < 0.00$, meaning higher scores of maternal dysregulation were associated with higher Negative Affect scores in their children. The prenatal DERS was negatively associated with the IBQ-R for Self-Regulation, $r(232) = -0.16$, $p = 0.02$, which indicates that higher scores of maternal dysregulation were associated with lower scores for infant Self-Regulation. However, the DERS at the third trimester was not associated with any types of self-regulation during the Still Face Episode. The postnatal DERS at six months was similarly associated with the IBQ-R for Negative Affect, $r(249) = 0.33$, $p < 0.001$ and Self-Regulation, $r(249) = -0.15$, $p = 0.02$. While the postnatal DERS scores increased as Negative Affect scores increased, the DERS decreased as Regulation scores increased. In contrast to the lack of association found between the prenatal DERS and observations of infants' emotion regulation during the SFP, the postnatal DERS was associated with observed SR 0 (no visible regulation), $r(208) = 0.21$, $p = 0.003$, suggesting that as maternal scores for emotion regulation increase, infants spend less time regulating during the SFP. There was also a small but significant negative correlation between SR 1 (self-soothing regulation) and the postnatal DERS, $r(208) = -0.15$, $p = 0.03$, indicating that higher scores of maternal dysregulation were associated with infants spending less time regulating by self-soothing tactics during the SFP. As expected, the prenatal and postnatal DERS were positively associated, $r(222) = 0.72$, $p = < 0.001$.

To explore possible sample related sources of individual differences in both infant self-regulation and maternal dysregulation, associations with demographics were examined. This included infant ethnicity (Hispanic or not), mother's highest year of regular schooling (Mother School in Table 4), and infant sex. A small but significant association was found between mother's highest year of education and infant ethnicity, $r(228) = 0.14$, $p = 0.04$. However, neither variable was significantly associated with the main variables in question (i.e., infant regulation during the SFP, prenatal and postnatal DERS, etc.), as such, they were not included as covariates in the primary analyses. Child sex was also included in the preliminary analysis and yielded no significant correlations. Given the significant associations found among maternal reports of dysregulation, infant temperament, and infant's observed self-regulation, further testing of regression models was appropriate.

Table 3. *Descriptive Statistics*

Infant	**M or %**	**SD**	**Range**	
IBQ-R				
Negative Affect Composite	3.00	0.59	1.44 – 5.02	
Self-Regulation Composite	5.10	0.51	3.50 – 6.47	
Sadness	3.33	0.84	1.13 – 6.00	
Distress to Limitations	3.36	0.75	1.50 – 5.50	
Fear	2.41	0.88	1.14 – 5.81	
Rate of Recovery	4.01	0.99	1.08 – 7.00	
Self-Regulation				
% used no SR	1.50			
0 - no self-regulation visible	0.38	0.26	0.00 – 1.00	
1 – self-regulation	0.35	0.24	0.00 – 1.00	
2 - exploratory	0.19	0.23	0.00 – 1.00	
3 - attention seeking	0.08	0.12	0.00 – 0.50	
% used any SR	98.50			
Facial Distress				
% no facial distress visible	38.40			
1 - low intensity	0.09	0.11	0.00 – 0.67	
2 - medium intensity	0.08	0.15	0.00 – 0.78	
3 - high intensity	0.04	0.12	0.00 – 0.83	
% showed any facial distress	61.60			
Bodily Distress				
No bodily distress visible	22.60			
% showed any bodily distress	77.40			

Vocal Distress				
No vocal distress visible	5.00			
1 - low intensity	0.20	0.23	0.00 – 1.00	
2 - medium intensity	0.16	0.23	0.00 – 1.00	
3 - high intensity	0.02	0.06	0.00 – 0.52	
% showed any distress vocalization	95.00			
Mother	**M sum**	**SD**	**Range**	**% above clinical**
DERS 3rd trimester	65.69	17.53	36.00 – 121.00	7.80
DERS at 6 months postpartum	62.82	17.96	36.00 – 125.00	4.80

Table 4. *Intercorrelations*

	IBQ Neg	**IBQ Reg**	**SR 0**	**SR 1**	**SR 2**	**SR 3**	**Total Distress**	**Prenatal DERS**	**Postnatal DERS**	**Baby Ethnicity**	**Mother School**	**Child Sex**
IBQ Neg	-											
IBQ Reg	-0.25	-										
SR 0	0.13	0.02	-									
SR 1	-0.01	0.03	-0.53	-								
SR 2	-0.14	-0.10	-0.52	-0.33	-							
SR 3	0.01	0.10	-0.15	-0.22	-0.10	-						
SF Total Distress	0.05	0.10	0.13	0.07	0.00	-0.03	-					
Prenatal DERS	0.23**	-0.16	0.08	-0.07	-0.01	-0.02	-0.01	-				
Postnatal DERS	0.33**	-0.15	0.21**	-0.15	-0.07	-0.01	0.02	0.72**	-			
Baby Ethnicity	-0.01	-0.07	0.12	-0.09	0.03	-0.14	-0.11	-.04	-0.09	-		
Mother School	-0.01	-0.14	0.04	-0.06	0.02	-0.01	-0.05	0.09	0.01	0.14*	-	
Child Sex	0.08	0.30	-0.01	0.03	-0.08	0.10	-0.05	0.02	0.07	-0.13	0.02	-

* $p < 0.05$

** $p < 0.01$

*** $p < 0.01$

Three regression models of increasing complexity were used to test the proposed associations across each level of self-regulation during the Still Face Episode, which can be seen in Table 5. Model 1 consisted of the possible covariates, which were the IBQ-R for Negative Affect, Self-Regulation, and Total Infant Distress during the SFP. Self-regulation (SR) 0, which was when infants showed no sign of regulation, was borderline significantly associated with the IBQ-R for Negative Affect ($\beta = 0.06$, $t = 1.19$, $p < 0.10$) and Total Distress ($\beta = 0.02$, $t = 1.84$, $p < 0.10$) in Model 1. In Model 2, we added the Prenatal DERS during the third trimester. In this model, SR 0 (no regulation) was only borderline significantly associated with Total Distress during the SFP ($\beta = 0.03$, $t = 1.88$, $p < 0.10$). Lastly, Model 3 added the Postnatal DERS taken at six months. Again, a borderline significant association was found between SR 0 and Total Distress ($\beta = 0.03$, $t = 1.80$ $p < 0.10$). Most interesting was the significant association found between SR 0 and the postnatal DERS ($\beta = 0.00$, $t = 2.38$, $p < 0.05$), meaning that infants who spent more time not regulating had mothers with higher DERS scores at six months above and beyond the effects of IBQ-R scores, Total Distress, and the prenatal DERS.

For Self-Regulation 1, which is regulation through self-soothing strategies such as self-grasping or sucking, there were no significant associations found in Model 1 or Model 2. However, in Model 3, a significant negative association was found with the Postnatal DERS ($\beta = -0.00$, $t = -2.26$, $p < 0.05$). This indicates that infants spending less time using self-soothing regulatory strategies was associated with higher maternal postnatal DERS scores, when controlling for IBQ-R scores, Total Distress during the SFP, and the Prenatal DERS.

Outcomes for Self-Regulation 2, regulation by exploration, and Self-Regulation 3, attention seeking, for each model can be found in Table 5. There were no significant associations found between SR 2 or SR 3 with the Prenatal or Postnatal DERS.

Table 5. *Regression Models*

	Self-Regulation 0				Self-Regulation 1				Self-Regulation 2				Self-Regulation 3			
MODELS	B	(SE B)	*t*	[95% CI]	B	(SE B)	*t*	[95% CI]	B	(SE B)	*t*	[95% CI]	B	(SE B)	*t*	[95% CI]
Model 1																
IBQ Neg	0.06	(0.03)	1.19#	[-0.00, 0.12]	-0.01	(0.03)	-0.16	[-0.06, 0.05]	-0.06	(0.03)	-2.34*	[-0.11, -0.01]	0.01	(0.01)	0.46	[-0.02, 0.03]
IBQ Reg	0.02	(0.04)	0.61	[-0.05, 0.09]	0.01	(0.03)	0.22	[-0.06, 0.07]	-0.05	(0.03)	-1.79#	[-0.12, 0.01]	0.03	(0.02)	1.55	[-0.01, 0.06]
SF Total Distress	0.02	(0.01)	1.84#	[-0.00, 0.05]	0.01	(0.01)	1.03	[-0.01, 0.04]	-0.03	(0.01)	-2.95**	[-0.05, -0.01]	-0.00	(0.01)	-0.64	[-0.02, 0.01]
	$F(3,219) = 2.59$ $r^2 = 0.04$, $p = 0.05$				$F(3,219) = 0.40$ $r^2 = 0.01$, $p = 0.05$				$F(3,219) = 5.91$ $r^2 = 0.08$, $p = 0.05$				$F(3,219)$ $r^2 = 0.01$, $p = 0.05$			
Model 2																
IBQ Neg	0.05	(0.04)	1.54	[-0.02, 0.12]	-0.02	(0.03)	-0.73	[-0.09, 0.04]	-0.04	(0.03)	-1.95	[-0.10, 0.02]	0.01	(0.02)	0.63	[-0.02, 0.04]
IBQ Reg	0.01	(0.04)	0.33	[-0.07, 0.09]	-0.02	(0.04)	-0.41	[-0.09, 0.06]	-0.03	(0.04)	-0.87	[-0.10, 0.04]	0.03	(0.02)	1.69	[-0.01, 0.07]
SF Total Distress	0.03	(0.01)	1.88#	[-0.00, 0.05]	0.01	(0.01)	0.90	[-0.01, 0.04]	-0.03	(0.01)	-2.74**	[-0.06, -0.01]	-0.01	(0.01)	-0.77#	[-0.02, 0.01]
Prenatal DERS	0.00	(0.00)	0.74	[-0.00, 0.00]	-0.00	(0.00)	-0.84	{-0.00, 0.00]	0.00	(0.00)	0.09	[-0.00, 0.00]	-0.00	(0.00)	-0.10	[-0.00, 0.00]
	$F(4,186) = 1.87$ $r^2 = 0.04$, $p = 0.05$				$F(4,186) = 0.57$ $r^2 = 0.01$, $p = 0.05$				$F(4,186) = 2.62$ $r^2 = 0.05$, $p = 0.05$				$F(4, 186) = 0.83$ $r^2 = 0.02$, $p = 0.05$			
Model 3																
IBQ Neg	0.04	(0.04)	0.98	[-0.04, 0.11]	-0.00	(0.03)	-0.09	[-0.07, 0.06]	-0.04	(0.03)	-1.20	[-0.10, 0.03]	0.01	(0.02)	0.31	[-0.03, 0.04]
IBQ Reg	0.03	(0.04)	0.77	[-0.05, 0.12]	-0.03	(0.04)	-0.72	[-0.10, 0.05]	-0.04	(0.04)	-1.11	[-0.11, 0.03]	0.04	(0.02)	1.85#	[-0.00, 0.07]
SF Total Distress	0.03	(0.01)	1.80#	[-0.00, 0.05]	0.01	(0.01)	0.79	[-0.02, 0.04]	-0.03	(0.01)	-2.58*	[-0.05, -0.01]	-0.00	(0.01)	-0.60	[-0.02, 0.01]
Prenatal DERS	-0.00	(0.00)	-0.91	[-0.00, 0.00]	0.00	(0.00)	0.85	[-0.00, 0.00]	0.00	(0.00)	0.09	[-0.00, 0.00]	0.00	(0.00)	0.14	[-0.00, 0.00]
Postnatal DERS	0.00	(0.00)	2.38*	[0.00, 0.01]	-0.00	(0.00)	-2.26*	[-0.01, 0.00]	0.00	(0.00)	-0.24	[-0.00, 0.00]	0.00	(0.00)	-0.27	[-0.00, 0.00]
	$F(5,179) = 2.77$ $r^2 = 0.07$, $p = 0.05$				$F(5,179) = 1.980$ $r^2 = 0.4$, $p = 0.05$				$F(5,179) = 2.02$ $r^2 = 0.05$, $p = 0.05$				$F(5,179) = 0.80$ $r^2 = 0.02$, $p = 0.05$			

** correlation is significant at the 0.01 level

* correlation is significant at the 0.05 level

correlation is significant at the 0.10 level

Discussion

This study sought to examine associations between maternal reported emotional dysregulation and the self-regulation abilities of their six-month-old infants. It was hypothesized that high levels of emotion dysregulation, reported by mothers during their third trimester of pregnancy, would be associated with lower levels of observed infant self-regulation abilities at six months during the Still Face Paradigm (SFP). The study found no association between any type of self-regulation and mothers' reported emotion dysregulation at their third trimester of pregnancy. As such, this study was unable to support the findings of Ostlund et al. (2019) which found that newborns of mothers reporting high dysregulation prenatally had low attention and arousal, indicating poor self-regulation. The previous study suggested a prenatal pathway of emotion regulation transmission, which the current study findings did not support. Instead, an association was found between maternal reported emotion dysregulation postnatally at 6 months and infant observed self-regulation during the Still Face Episode.

Specifically, as mothers reported greater dysregulation, the absence of self-regulation in infants (self-regulation 0) also increased. This supports the idea that a more dysregulated mother appears to have a baby that is poorer at self-regulation. This conclusion is further supported by the negative association found between the maternal dysregulation and self-soothing regulation in infants, meaning that mothers who report high levels of dysregulation tend to have babies that engage in very little self-soothing when distressed during the SFP. These findings support the results from Binion and Zalewski (2018), which found that more dysregulated mothers were more likely to have preschoolers with poor self-regulation skills. Additionally, the current findings align with those of Thomas et al. (2017), which found that high maternal sensitivity, in spite of psychopathology that results in poor emotion regulation, to be a mitigating factor in relation to infant self-regulation. This demonstrates how caregiving skills, such as being responsive and attentive to one's child, can influence infant development of self-regulation. All of these studies as a whole support the idea that environmental factors, such as caregiving skills or mother-infant interaction, impact infant self-regulation abilities. Overall, the present study supports the previous literature demonstrating a relationship between maternal dysregulation and infant self-regulation.

Previous studies have demonstrated that infants rely on their caregiver to support the development of their self-regulation capacities (Thompson & Goodman, 2010). This study further supports that relationship by demonstrating how mothers' emotion dysregulation is associated with infant's lack of self-regulation. When an infant depends upon a dysregulated caregiver, they are unable to properly co-regulate with their caregiver, resulting in poor regulation. This study illustrates how important adequate emotion regulation is in mothers to aid their infants' self-regulation capacities.

The multi-method approach to data collection was a strength of this study. While maternal data was collected by a questionnaire, infant self-regulation was assessed through observed behavior during the Still Face Paradigm, a paradigm designed to elicit negative affect and self-regulation in infants. In addition to the behavior analysis, mothers were able to report infant temperament through the IBQ-R. This multimethod approach of data collection decreases possible inaccuracies influencing the data due to self-report. For instance, if a mother has poor emotion regulation, she may be more likely to see her infant's temperament in a negative light. Using behavioral observation helped mitigate these possible biases. Moreover, microcoding in epochs of five seconds, rather than a more generalized global coding system, allowed for the detection of more subtle or nuanced forms of self-regulation. An additional strength was the study sample, which was fairly large and included mothers with a wide range of emotion dysregulation (see Table 3).

A strength in the study design was the use of a prenatal measure, which allowed for potential predictive associations to be studied. Collecting mothers' perceived dysregulation both prenatally and postnatally allowed us to examine whether associations between maternal dysregulation and infants emerging regulatory capacities were biological, possible due to prenatal programming, or environmental and occurring due to socialization. In this study, mothers' prenatal reports of their dysregulation, however, was not associated with postnatal infant regulatory behavior, whereas their postnatal reports were. Given the association between mothers' reports of postnatal dysregulation and their infants observed regulatory capacities, bidirectionality must be considered. It cannot be assumed that maternal dysregulation results in an infant's poor regulation, because there is also the possibility that a dysregulated infant causes higher stress in a mother and worsens her regulation skills (Binion & Zalewski, 2019). Future studies could further dissect these associations by including earlier prenatal maternal measures, such as during the first trimester, to test a predictive association. Similarly, future studies could get an earlier measure of infant regulation. For instance, Ostlund et al. (2019) measured maternal emotion dysregulation after the 25^{th} week of pregnancy and measured infants 24 hours after birth at minimum. Although it is difficult to measure self-regulation in newborns, any significant associations found would suggest a biological transmission rather than impact of environmental factors. Lastly, the issue could also be addressed by creating an intervention that targets mothers with high emotion dysregulation. The study could include pre- and post-intervention analyses to determine whether improving mothers' emotion regulation skills also improved their child's self-regulation capacities.

Another drawback of this study was due to the onset of the COVID-19 pandemic. When a stay-at-home mandate went into effect, the modality of in-person visits had to change to remote. Only 69 out of 221 visits were done in the controlled lab environment. Visits done over Zoom likely had high variability because they were conducted in the participants' homes rather than in the controlled lab environment. Some issues we saw were the infants being easily distracted by toys, other people, pets, or the computer. Furthermore, the infant is most likely more comfortable in a home environment than a lab environment, so that could also lead to significant differences in behavior. Ideally, future studies would have all visits completed in the same setting. This would rule out variances in environment that could cause differences in behavior. Differently, future studies could also compare lab visits to remote visits for significant behavioral differences.

An additional limitation of the study is the lack of demographic diversity within the sample. As shown in Table 1, almost 80% of the study participants were Caucasian and more than 80% were married and living with their spouse. Therefore, the study could be missing possible sources of individual differences that could influence emotion regulation. Moreover, this makes the study findings less generalizable to a more diverse population. A more generalizable analysis should include more diversity in order to better detect possible covariates and individual differences.

A final limitation of this study is the possible influences of self-report bias. As previously mentioned, using a multimethod approach for measuring infant regulation helped avoid mothers' bias when reporting on their child's behavior. However, only self-report was used to measure maternal emotion regulation. Self-serving reports could lead to an inaccurate depiction of their regulatory abilities. To address this problem, future studies could include behavioral measures and observations of maternal emotion regulation or clinical ratings.

In conclusion, the findings of this study support the previous literature that demonstrates maternal emotion dysregulation as a risk factor for their children's self-regulation abilities. We found that infants of more dysregulated mothers tend to have infants who self-regulate less in a stressful situation. Because this association was found with mothers and infants postnatally, this suggests that emotion dysregulation may be transmitted through external, environmental factors. Overall, this study supports the idea of intergenerational transmission of emotion dysregulation from mothers to their children. This demonstrates a need for interventions targeted at emotion regulation of new mothers.

Bibliography

Beauchaine, T.P. (2015). Future directions in emotion dysregulation and youth psychopathology. *Journal of Clinical Child and Adolescent Psychology, 44*, 875–896.

Beauchaine, T.P., & Zisner, A. (2017). Motivation, emotion regulation, and the latent structure of psychopathology: An integrative and convergent historical perspective. *International Journal of Psychophysiology, 117*, 108–111.

Binion, G., & Zalewski, M. (2018). Maternal emotion dysregulation and the functional organization of preschoolers' emotional expressions and regulatory behaviors. *Emotion, 18*(3), 386–399. https://doi.org/10.1037/emo0000319

Bridgett D.J., Burt N.M., Edwards E.S., & Deater-Deckard K. (2015). Intergenerational transmission of self-regulation: A multidisciplinary review and integrative conceptual framework. *Psychology Bulletin, 141*(3), 602-654.

Bush, N., Jones-Mason, K., Coccia, M., Caron, Z., Alkon, A., Thomas, M., . . . Epel, E. (2017). Effects of pre- and postnatal maternal stress on infant temperament and autonomic nervous system reactivity and regulation in a diverse, low-income population. *Development and Psychopathology, 29*(5), 1553-1571.

Cole, P. M., Dennis, T. A., Martin, S. E., & Hall, S. E. (2008). Emotion regulation and the early development of psychopathology. In M. Vandekerckhove, C. von Scheve, S. Ismer, S. Jung, & S. Kronast (Eds.), Regulating emotions: Culture, social necessity, and biological inheritance (pp. 171–188). Blackwell Publishing. https://doi.org/10.1002/9781444301786.ch7

Cole, P., Martin, S., & Dennis, T. (2004). Emotion regulation as a scientific construct: methodological challenges and directions for child development research. *Child Development, 75(*2), 317-333.

Conradt, E., & Ablow, J.C. (2010). Infant physiological response to the still-face paradigm: Contributions of maternal sensitivity and infants' early regulatory behavior. *Infant Behavior and Development, 33*, 251-265.

Crowell, S. E., Vlisides-Henry, R. D., & Kaliush, P. R. (2019). Emotion generation, regulation, and dysregulation as multilevel transdiagnostic constructs. *The Oxford Handbook of Emotion Dysregulation*, 84–97. https://doi.org/10.1093/oxfordhb/9780190689285.013.7

Davis, E. P., Glynn, L. M., Waffarn, F., & Sandman, C. A. (2011). Prenatal maternal stress programs infant stress regulation. *Journal of child psychology and psychiatry, and allied disciplines, 52*(2), 119–129. https://doi.org/10.1111/j.1469-7610.2010.02314.x

Fernandez, K.C., Jazaieri, H., & Gross, J.J. (2016). Emotion regulation: A transdiagnostic perspective on a new RDoC domain. *Cognitive Therapy and Research, 40*, 426–440.

Gartstein, M.A., Rothbart, M.K., 2003. Sudying infant temperament via the revised infant behavior questionnaire. *Infant Behavior Development, 16*, 64-86.

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment, 26*, 41–54. http://dx.doi.org/10.1023/B:JOBA.0000007455.08539.94

Ham, J., & Tronick, E. (2006). Infant resilience to the stress of the still-face: Infant and maternal psychophysiology are related. *Annals New York Academy of Science, 1094*, 297-302.

Holochwost, S., Gariepy, J., Propper, C., & Mills-Koonce, W. (2014). Parenting behaviors and vagal tone at six months predict attachment disorganization at twelve months. *Developmental Psychobiology*, 56. 10.1002/dev.21221.

Kogen, N., & Carter, A.S. (1996). Mother-infant reengagement following the still-face: The role of maternal emotional availability in infant affect regulation. Infant *Behavior and Development, 19*, 359-370.

Korja, R., Nolvi, S., Grant, K., & McMahon, C. (2017). The Relations Between Maternal Prenatal Anxiety or Stress and Child's Early Negative Reactivity or Self-Regulation: A Systematic Review. *Child Psychiatry and Human Development, 48*(6), 851-869.

MacLean, P. C., Rynes, K. N., Aragón, C., Caprihan, A., Phillips, J. P., & Lowe, J. R. (2014). Mother–infant mutual eye gaze supports emotion regulation in infancy during the Still-Face paradigm. *Infant Behavior and Development, 37*(4), 512–522. https://doi.org/10.1016/j.infbeh.2014.06.008

Manian, N., & Bornstein, M. H. (2009). Dynamics of emotion regulation in infants of clinically depressed and nondepressed mothers. *Journal of Child Psychology and Psychiatry, 50*(11), 1410–1418. https://doi.org/10.1111/j.1469-7610.2009.02166.x

Mesmen, J., van Ijzendoorn, M.H., & Bakermans-Kranenburg, M.J. (2009). The many faces of the Still-Face Paradigm: A review and meta-analysis. *Developmental Review, 29*, 120- 162.

Moore, G.A., Hill-Soderlund, A.L., Propper, C.B., Calkins, S.D., Mills-Koonce, W.R., Cox, M.J., (2009). Mother–infant vagal regulation in the face-to-face still-face paradigm is moderated by maternal sensitivity. *Child Development, 80*, 209–223.

Ostlund, B. D., Vlisides-Henry, R. D., Crowell, S. E., Raby, K. L., Terrell, S., Brown, M. A., … Conradt, E. (2019). Intergenerational transmission of emotion dysregulation: Part II. Developmental origins of newborn neurobehavior. *Development and Psychopathology, 31*(3), 833–846. https://doi.org/10.1017/s0954579419000440

Propper, C., Moore, G.A., Mills-Koonce, W.R., Halpern, C.T., Hill-Soderlund, A.L., Calkins, S.D., Carbone, M.A., & Cox, M. (2008). Gene– Environment Contributions to the Development of Infant Vagal Reactivity: The Interaction of Dopamine and Maternal Sensitivity. *Child Development, 79*(5), 1377-1394.

Sheppes, G., Suri, G., & Gross, J. J. (2015). Emotion regulation and psychopathology. Annual review of clinical psychology, 11, 379–405. https://doi.org/10.1146/annurev-clinpsy-032814-112739

Thomas, J. C., Letourneau, N., Campbell, T. S., Tomfohr-Madsen, L., & Giesbrecht, G. F. (2017). *Developmental origins of infant emotion regulation: Mediation by temperamental negativity and moderation by maternal sensitivity*. *Developmental Psychology, 53*(4), 611–628. https://doi.org/10.1037/dev0000279

Thompson, R. A., & Goodman, M. (2010). Development of emotion regulation: More than meets the eye. In A. M. Kring & D. M. Sloan (Eds.), Emotion regulation and psychopathology: A transdiagnostic approach to etiology and treatment (pp. 38–58). The Guilford Press.

Tronick, E., Als, H., Adamson, L., Wise, S., & Brazelton, T. B. (1978). The infant's response to entrapment between contradictory messages in face-to-face interaction. *Journal of American Academy of Child Psychiatry, 17*(1), 1–13.

Warnock, F., Craig, K., Bakeman, R., Castral, T., & Mirlashari, J. (2016). The relationship of prenatal maternal depression or anxiety to maternal caregiving behavior and infant behavior self-regulation during infant heel lance: An ethological time-based study of behavior. *BMC Pregnancy and Childbirth, 16*(1), 264.