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Examining Interactions of Parental Psychopathology and Parental Resources on Infant Affect Regulation with Mothers and Fathers

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EXAMINING INTERACTIONS OF PARENTAL PSYCHOPATHOLOGY AND PARENTAL RESOURCES ON INFANT AFFECT REGULATION WITH MOTHERS AND FATHERS

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EXAMINING INTERACTIONS OF PARENTAL PSYCHOPATHOLOGY AND PARENTAL RESOURCES ON INFANT AFFECT REGULATION WITH MOTHERS AND FATHERS

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Parents play a significant role in infant emotional development; specifically, infant affect regulation (Taipale, 2016). Various sources of stress might influence how parents interact with their infants as well as infant regulation. Parental psychopathology (depression, anxiety) has been associated with increases in infant negative affect (Forbes et al., 2004; Reck et al., 2018). Parental resources, another source of stress, is associated with parenting during parent-infant interactions and subsequent infant socioemotional outcomes (Lickenbrock & Braungart-Rieker, 2015; Lin & Seo, 2017). Research examining these sources of stress in the parent-infant relationship with mothers and fathers and subsequent infant affect regulation is limited. In addition, paternal psychopathology and infant affect regulation with fathers has not been extensively examined (Braungart-Rieker et al., 1998; Graham et al., 2018). The current study addressed this gap in the literature by examining whether parental psychopathology and parental resources were associated with infant affect regulation with mothers and fathers.

Participants included mothers, fathers, and infants at 4- and 8- months of age from a larger, longitudinal study (n = 98) examining infant social and emotional development. Parents completed an interview assessing their age, education level, occupation, and family income (parental resources). Parents also completed the Inventory of Depression and Anxiety Symptoms to measure general depression and social anxiety symptoms (Watson et al., 2007). Parents and infants participated in a face-to-face play task at each

time-point (Still-Face Paradigm; Tronick et al., 1978) with parent order counterbalanced. Infant affect was rated by trained, reliable coders during the SFP using an established coding scheme (Braungart-Rieker et al., 2014).

Findings revealed that parental resources did not moderate the association between parent psychopathology symptoms at 4-months and infant negative affect at 8-months with mothers and fathers. Results revealed a significant positive association between parental resources and infant negative affect with mothers; increased parental resources was associated with increased infant negative affect. Exploratory findings revealed significant positive associations between mother age and infant negative affect as well as mother/father education and infant negative affect. In conclusion, this study highlights the importance of examining various sources of stress in parents in association with infant emotional development.

Introduction

Raising an infant can be difficult as a parent. Some parents also have to manage various sources of stress (e.g., psychopathology symptoms and parental resources) that may influence how they interact with their infants; thus, possibly influencing the infant's own affect regulation (Forbes et al., 2004; Lickenbrock & Braungart-Rieker, 2015). Maternal psychopathology (e.g., depression and anxiety) has been studied throughout the years for the influence it may have on infants' affect and has yielded similar findings of infants showing increases in negative affect (Brooker et al., 2015; Forbes et al., 2004; Reck et al., 2018). However, limited studies have investigated the associations between father psychopathology and infant affect regulation (Braungart-Rieker et al., 1998; Forbes et al., 2018; Reck et al, 2018).

Another source of stress for parents is having limited parental resources (e.g., parent age, education, occupation, and socioeconomic status) that may also influence their interactions with their infant (Lickenbrock & Braungart-Rieker, 2015) as well as subsequent infant affect (Lin & Seo, 2017). These components of parental resources (parent age, education, occupation, and socioeconomic status) have been examined individually in association with child emotional development and the parent-infant interaction (Lickenbrock & Braungart-Rieker, 2015; Strazdins et al., 2010). However, no studies have examined whether these components are associated with infant affect regulation all in one study. In addition, no study has examined whether parental psychopathology and parental resources are associated with infant affect regulation. The current study aims to address these gaps in the literature by examining associations

between parent psychopathology, parental resources, and infant affect regulation with mothers and fathers.

Infant Affect Regulation

Infant affect regulation refers to the infant's ability to control or modulate facial expressions and/or vocalizations (Taipale, 2016). There are two types of infant affect that have been examined in the literature: negative and positive affect. Negative affect includes frowning and negative vocalizations, such as crying and fussiness (Mesman et al., 2009; Moore et al., 2001). Negative affect can be described in relation to withdrawal and inhibited behavior (Dollar & Buss, 2014; Holzman et al., 2018; Sullivan, 2014). Studies examining withdrawal behavior have used negative affect as a measure for inhibition (Putnam & Stifter, 2002; Sullivan, 2014). Holzman et al. (2018) noted that children who were high in negative affect and had parents who exhibited negative parenting (i.e., negative displays of emotions and controlling behavior) decreased in approach behavior and increased in inhibitory behavior. Infants who were also high in crying, or negative affect, showed higher internalizing problems in toddlerhood that can coincide with more inhibitory or withdrawn behaviors (Brooker et al., 2015; Mesman et al., 2009). Overall, infant affect regulation is an important developmental tool for the management of emotions and may possibly predict socio-emotional adjustment later in life (Grant et al., 2010).

Positive and negative affect can be theorized as two separate components of emotion regulation (Busseri & Sadava, 2011; Joshanloo & Bakhshi, 2016). This entails that positive and negative affect are not on a continuum but rather two independent components that predict different outcomes in children (Busseri & Sadava, 2011;

Mesman et al., 2009). Both types of affect have been shown to predict separate socio-emotional adjustment in children depending on if they are high or low in either affect (Dollar & Buss, 2014; Holzman et al., 2018; Mesman et al., 2009). When examining affect as two separate components, research on infant affect with parental influence has focused more on negative infant affect during mildly frustrating situations compared to positive affect (Grant et al., 2010; Mesman et al., 2009). Therefore, the current study only examined infant negative affect during a mildly frustrating parent-infant interaction.

The Still-Face Paradigm (SFP; Braungart-Rieker et al., 1998; Tronick et al., 1978) is a commonly used assessment of the parent-infant dyad that has the potential to introduce negative affect into the child's lab experience. The SFP can be used to assess how an infant responds to a lack of parental interaction (Tronick et al., 1978). The SFP consists of three episodes: play, still-face, and reunion. During the play episode, the parent interacts normally with his/her infant without toys. During the still-face episode, the parent breaks from interacting with the infant and has a neutral expression on his/her face. During the reunion episode, the parent interacts with his/her infant again. Infants' level of affect/arousal changes over the course of the SFP, resulting in the "Still-Face Effect" (Mesman et al., 2009). Specifically, infants show an increase in negative affect during the still-face episode compared to the initial play episode and then show a decrease in negative affect from the still-face episode to the reunion episode (Adamson & Frick, 2003). The Still-Face Effect can be depicted as an inverted U-shape pattern across the three episodes of the SFP (DiCorcia et al., 2016; Ekas et al., 2013). The higher levels of negative affect during the still-face episode are attributed to the break in the normal parent-infant interaction with parents only displaying neutral facial expressions and no

vocalizations (DiCorcia et al., 2016; Ekas et al., 2013; Mesman et al., 2009). The reunion episode is a helpful tool to observe how quickly the infant can reorganize or regulate their emotions following a distressing situation (Adamson & Frick, 2003). The current study examined infant negative affect within the context of the parent-infant interaction using the SFP.

Parents and Infant Affect Regulation

Previous studies that examined the parents' role in infant affect regulation have predominately focused on the mother-infant relationship (Graham et al., 2018; Taipale, 2016), specifically the role of the mother in regard to helping or aiding in their infants' affect regulation (Maltesta & Haviland, 1982; Mesman et al., 2009; Taipale, 2016). Mothers actively engage in positive expressions and gameplaying when interacting with their infants (Field, 2010). Furthermore, when mothers express positive affect/expressions towards their infants, infants show positive affect and higher arousal in response (Feldman, 2007).

Despite the focus on the role of mothers, the fathers' role in infant affect regulation has not been thoroughly studied (Braungart-Rieker et al., 1998; Forbes et al., 2004). Moreover, studies examining both mother and father predictors of infant affect regulation are sparse (Braungart-Rieker et al., 1998; Braungart-Rieker et al., 2001; Braungart-Rieker et al., 2014; Forbes et al., 2004). Research examining parental interaction observed fathers typically using more physical play when interacting with their infants compared to mothers (Ekas et al. 2013). These differences may translate over to how the infant responds to the parent when more physical touch is used during interaction. Infants show less negative affect as time goes on during father-infant

interactions compared to mother-infant interactions (Ekas et al., 2013). Infants may not feel as distressed with fathers compared to mothers during the still-face episode because fathers spend less time with their infants compared to mothers. As a result, infants might rely more on their mothers to help regulate their affect compared to fathers and may be less distressed by their fathers' still face. However, Feldman (2007) noted that infants may show higher and more frequent positive vocalizations (i.e., giggling) with fathers who both are higher in involvement and have increased positivity during play interactions.

Past developmental research has considered mothers to be the primary caregivers, and thus more involved than fathers with their infants (Braungart-Rieker et al., 1998; Davison et al., 2016; Parent et al., 2018). In addition, fathers tend to be excluded from research because of difficulties in getting them to participate due to various reasons. Fathers may be less likely to take part in research projects with their infants than mothers because of conflicts with fathers' work schedules, fathers' lack of interest in participating, and fathers simply not being approached to participate (Davison et al., 2016; Parent et al., 2018). As a result, examining infant affect regulation in the context of the mother-infant relationship has been the norm (Parent et al., 2018).

Over the recent years, fathers have increasingly become more involved with their children (Braungart-Rieker et al., 2014; Parent et al., 2018). To date, there has been an increased amount of infant affect regulation research including both mothers and fathers; yet, only a few have examined both mother and father participants during the SFP (Braungart-Rieker et al., 1998; Braungart-Rieker et al., 2014; Forbes et al., 2004). Braungart-Rieker et al. (1998) and Forbes et al. (2004) noted differences when examining

both mother and father influence on infant affect and interaction with their infants during the SFP. Both studies observed mothers showing higher instances of positive affect such as smiling more at their infants, but fathers showing more instances of physical play (Braungart-Rieker et al., 1998; Forbes et al., 2004).

Despite these differences in how mothers and fathers interact with their infants, research has found no differences in levels of infant negative affect displays with parents during the SFP (Forbes et al., 2004). For example, Forbes et al. (2004) found that infants did not show higher or lower levels of negative affect from one parent to the other during the SFP. Braungart-Rieker et al. (1998) also noted that infant negative affect did not differ in mother versus father interaction. Additional studies are needed to examine the similarities and differences in infant negative affect regulation in response to mothers versus father interaction. Therefore, the current study examined infant affect regulation with both mothers and fathers during the SFP.

Parental Psychopathology

Parental psychopathology has been found to influence infant negative affect (Brooker et al., 2015; Forbes et al., 2004, Reck et al., 2018). Normally, parents not only help the infant regulate his/her facial expressions and/or vocalizations but also maintain them (Taipale, 2016). If parents have depressive or anxiety symptoms, it may negatively interfere with infant-parental interaction (Field, 2010). Given that depression affects one's mood and/or emotions, depression can affect how a parent interacts with his/her infant on a daily basis. For example, parents with depression might be more emotionally withdrawn and show increased instances of negative affect, such as frowning or crying (Cohn et al., 1990). As a result, the infant may display higher negative affect (Cohn et al.,

1990). Moreover, when the parent becomes disengaged, the infant may also become disengaged or try to re-engage the parent (Taipale, 2016). The infant may be influenced by the parent's withdrawal interaction and may also become more withdrawn. Overall, increased parental psychopathology symptoms might be associated with higher instances of negative infant affect.

Depression is a mood disorder where an individual may feel sad and hopeless with feelings of anhedonia (American Psychiatric Association, 2013). Mothers with depression display emotions differently than mothers without depression. For example, they tend to display more negative affect overall (Manian & Bornstein, 2009). Field et al. (2007) found that mothers with depression showed less vocal and positive facial expressions such as smiling when interacting with their infants compared to mothers without depression. Infants might be reacting to the mother's emotion displays by expressing less positive facial expressions and showing higher instances of negative affect. Field (2010) also noted that these findings for infant-maternal interaction of mothers with depression have been observed across many countries and cultures around the world including Switzerland, England, and in Arabic cultures. Thus, a mother showing more negative affect will impact infants' affect negatively during the interaction with their infants compared to mothers without depression (Field et al., 2007).

Research has primarily focused on mothers with depression as a moderator for infant negative affect. Mothers with depression have been theorized to be more under-stimulating when interacting with their infants (Field, 2010). The difference in interactive styles may influence how the infant then interacts with the mothers. Mothers with depression might be less interactive and more withdrawn with their infants overall

compared to mothers without depression (Field et al., 2007; Manian & Bornstein, 2009). Manian and Bornstein (2009) explained that maternal depression can lead the mothers to be less aware of their infant's emotional state, which may lead to failing to provide appropriate stimulation for the infant.

Maternal depression has been examined in infant affect literature whereas studies on paternal depression have been limited. These results from the limited studies examining fathers with depression seem to show an impact of paternal depression on infant affect regulation. Similar to the research with mothers, fathers with depressive symptoms are less positive overall and have less positive engagement with their infant (Forbes et al., 2004). Sethna et al. (2015) also found that fathers with depression seemed to be more withdrawn verbally when interacting with their infants compared to fathers without depression.

Infants also seemed to show more negative affect during the still-face episode of the SFP for both mothers and fathers with depressive symptoms. Forbes et al. (2004) observed that infants of mothers and fathers with depression showed higher negative affect during the Still-Face Paradigm than did infants of parents without depression. Parents also seemed to show an increase of negative affect if they had depressive symptoms compared to parents without depressive symptoms (Forbes et al., 2004). Overall, even with limited research on fathers with depression, there has been similar patterns of associations between parent depression and infant affect regulation with mothers and fathers. However, further research is needed to examine these patterns between mothers and fathers with depression.

Anxiety is defined as being overly cautious and vigilant about any future threat as well as excessive avoidant behaviors (American Psychiatric Association, 2013). Parents with higher anxiety may display more negative affect which can have an impact on their infants who are observing their parents' affect (Brooker et al., 2015). Research has shown that higher levels of infant negative affect was related to higher parental anxiety symptoms (Brooker et al., 2015). Parents with higher anxiety symptoms may be reacting more negatively during interactions with their infants. Infants may rely on their parents to guide to their own emotions; parents higher in anxiety symptoms may also be displaying increased negative affect and influence their infants' own affect.

Research examining mothers' anxiety as an influence for infant affect has been limited. Yet, there have been differences observed in infant negative affect and the mother's behavior when the mother had anxiety symptoms versus mothers without symptoms. Reck et al. (2018) found that infants of mothers with anxiety showed lower positive engagement during the still-face episode of the SFP compared to infants of mothers without anxiety. Infants of mothers with anxiety have also been shown to be less socially engaged than infants of mothers without anxiety (Reck et al., 2018). Mothers with anxiety are less interactive with their infants, and their infants are lower in positive affect and warmth compared to mothers without anxiety (Reck et al., 2018; Feldman, 2007). Brooker et al. (2015) found that maternal anxiety symptoms did predict higher infant negative affect after a 9-month follow up. In sum, there is evidence suggesting maternal anxiety symptoms are associated with infant affect regulation. However, further research is needed to replicate this finding in additional samples.

Research examining whether paternal anxiety is associated with infant affect is even more limited. Fathers with anxiety may increase the risk of their child developing internalizing problems later in life (Brooker et al., 2015). Paternal anxiety has also been linked to infants having higher negative affect long term compared to maternal anxiety. Specifically, paternal anxiety symptoms predicted a higher increase in infant negative affect after a 9-month follow-up similar to that of mothers with anxiety. Yet, a study conducted by Luoma et al. (2012) observed that father anxiety symptoms and infant withdrawal symptoms were not associated with one another. Another study by Ierardi et al. (2019) examined the styles of interaction between mothers and fathers with anxiety and found that there were no differences between the parents when interacting with their infant. Future research is still needed to further examine associations between parental anxiety and infant affect regulation with mothers versus fathers.

Previous research focusing on parental anxiety symptoms have not examined social anxiety in relation to infant affect regulation. Most studies have focused on general anxiety disorder in parents and its impact on infant affect (Brooker et al, 2015; Ierardi et al, 2019; Luoma et al, 2012). *General anxiety* includes overthinking and being overly cautious of any future threat that may arise whereas social anxiety is the fear of social performance and/or interaction (American Psychiatric Association, 2013). No study to date has examined social anxiety symptoms in parents and its impact on infant affect regulation. *Social anxiety* is defined as the persistent fear for social performance or interactions (American Psychiatric Association, 2013). Parents with high social anxiety symptoms might feel social performance pressure in response to being observed/video-recorded during laboratory visits with their infants. As a result, these parents may react

negatively during this situation, and their infants might also respond with increased negative affect during the SFP. Future research is needed to examine if social anxiety, opposed to general anxiety symptoms, in parents may be a better predictor for infant negative affect during the SFP.

In sum, the association between parental depression and infant affect regulation has been studied more often than parental anxiety. However, research examining both maternal and paternal psychopathology symptoms in the same study are limited (e.g., Brooker et al., 2015; Forbes et al., 2004). Additionally, parents with social anxiety symptoms have yet to be examined in the infant affect literature. Both parents have been shown to interact with their infants differently when having depression and/or anxiety symptoms compared to parents without symptoms (Brooker et al., 2015; Forbes et al., 2004). Parents with psychopathology symptoms may show higher instances of negative affect when the infant is present, which might influence the infant's own affect. The current study examined both parental depressive and social anxiety symptoms as a moderator of infant negative affect with mothers and fathers.

Parental Resources

When raising an infant, there are particular resources parents may or may not have that might impact stress levels and in turn impact their interactions with their infant, and their infant's affect (Lickenbrock & Braungart-Rieker, 2015). *Parental resources* are defined as factors that contribute to how a parent raises and adapts to parenting challenges when raising an infant (Lickenbrock & Braungart-Rieker, 2015). The parental resources of interest for the current study are as follows: parent age, parent education level, parent occupation, and socioeconomic status (SES). Parents high in parental

resources are expected to have more resources available and have the potential to adapt more efficiently to everyday challenges of raising an infant. Parents with higher parental resources are then more likely to adapt to everyday challenges of raising an infant compared to parents with lower parental resources. Parents with higher parental resources may also have less stress because of their better adaptation to challenges in everyday life compared to parents with lower parental resources. The bulk of previous research has separately examined components of parental resources and their impact on parent-infant interaction and overall child development (e.g., Lin & Seo, 2016), with only one study to date examining them in combination (e.g., Lickenbrock & Braungart-Rieker, 2015). There is very limited research linking parental resources as a moderator of infant affect.

Literature examining parental resources have used other terms, such as cumulative risk factors, which are the opposite of parental resources. Cumulative risk factors could hinder the infants' overall development and can create distress in the child (Lin & Seo, 2016). When examining cumulative risk factors, studies tended to group a combination of age, education, occupation and SES (Browne & Leckie, 2016; Lin & Seo, 2017; Lickenbrock & Braungart-Rieker, 2015).

Parent age has been linked to differences in children's outcome and parents stress levels (Lickenbrock & Braungart-Rieker, 2015). Strazdins et al. (2010) noted that fathers who were young and had less education had children who had more difficulties in emotional regulation. Parents who are younger may also be less prepared for challenges that comes with raising an infant than parents who may be older due to less life experiences (Bornstein et al., 2006; Lickenbrock & Braungart-Rieker, 2015). Mothers who were younger tended to lack maturity and had difficulty in adapting to parenting

challenges relative to mothers who were older (Bornstein et al., 2006). Fathers who were younger tended to provide less parenting support than that of fathers who were older (Bornstein et al., 2006). This may be due to younger fathers not living with both mother and infant. Parent age thus might influence how parents interact with their infants.

Parents with a higher education level also tend to have more stimulating occupations than those who have less education (Hollingshead, 1975; Lickenbrock & Braungart-Rieker, 2015). In addition, parents with higher degrees might also have higher paying jobs and job security than those with less education (Lickenbrock & Braungart-Rieker, 2015). Parent occupation can have varying effects on parental stress and children's well-being (Lickenbrock & Braungart-Rieker, 2015; Strazdins et al., 2010). Occupations that are considered less intellectually stimulating can pose a risk to the parents' mental health and the children's emotional development (Strazdins et al., 2010). Children of parents who held jobs of lower quality (e.g., job insecurity, low pay, un-paid family leave and job inflexibility) showed emotion regulation difficulties compared to children of parents with high job quality.

SES has been linked to differences in child outcomes and development (Brandes-Aitken et al., 2019; Lickenbrock & Braungart-Rieker, 2015). Studies have examined the negative impact of poverty on children's growth. A study done by Brandes-Aitken and colleagues (2019) examined how poverty in infancy can later affect development at a kindergarten age and observed how children in poverty paid less attention and had self-regulation problems such as higher negative affect compared to children not in poverty. This stress can also influence parental psychopathology and parent-infant interaction. Ahmadi Doulabi et al. (2017) examined how SES can impact child development and

noted that parents who were low in SES had a higher risk of developing psychopathology symptoms such as depression compared to parents with higher SES. Studies have examined how parental depression can influence how parents interact with their infants by showing higher negative affect compared to parents without depression (Field et al., 2007). Overall, having lower SES can impact the amount of stress a parent may have and influence how parents might interact with their infants.

Demographic variables (e.g., parent age, education, occupation, and SES) tend to be associated with one another (Lickenbrock & Braungart-Rieker, 2015). For example, when examining parent education and occupation, a parent with a very high paying job will more than likely have a higher education than a parent with a low paying job. Yet, the combination of these demographic variables was expected to be a better way to get a more holistic measure the parents' resources rather than examining one variable or each variable separately. Examining the combination of parental resources instead of each resource individually will allow for a more thorough examination of the various resources parents may possess that can ultimately have an impact on infant's affect regulation.

The Present Study

The current study aims to examine associations between parental psychopathology (e.g., depression and anxiety symptoms), parental resources (e.g., parent age, parent education level, parent occupation, and socioeconomic status), and infant affect regulation during the SFP with mothers and fathers. The current study examined the following two hypotheses:

The first hypothesis predicted that parental resources would act as a moderator between parental psychopathology symptoms at 4-months and infant negative affect at 8-

months. Being either low or high in parental resources will strongly impact the infants' negative affect (Lickenbrock & Braungart-Rieker, 2015). Similar to studies examining each of the parental resources individually, parents who are high in parental resources may positively impact how parents interact with their infants and parental stress levels compared to parents low in parental resources (Lickenbrock & Braungart-Rieker, 2015; Strazdins et al., 2010). More specifically, parents who have high depression and/or social anxiety symptoms while also being low in parental resources were expected to have infants with the highest levels of negative affect. Furthermore, parents high in psychopathology symptoms and high in parental resources may predict high infant negative affect scores yet lower than to infants of parents with high in psychopathology symptoms and low in parental resources. High parental resources will act as a buffer for infant negative affect, even if the parents have high psychopathology symptoms. Parents who are low in depression and/or social anxiety symptoms and high in parental resources were expected to have infants low in negative affect. Lastly, parents low in both psychopathology symptoms and parental resources were expected to have infants with high levels of negative infant.

The second hypothesis predicted that there will be differential predictors of infant affect regulation with mothers versus fathers. This hypothesis was exploratory due to the limited research conducted on predictors of affect regulation with mothers versus fathers. For mothers, main effects were expected for both mother psychopathology symptoms and parental resources for predicting infant negative affect (See Figure 1). Mothers with higher psychopathology symptoms at 4-months were expected to have infants with higher negative affect at 8-months. In addition, mothers with lower parental resources at 4-

months was expected to be associated with higher infant negative affect at 8-months. This coincides with previous research examining mothers with higher psychopathology symptoms predicting higher infant negative affect than infants of mothers with lower psychopathology symptoms (Brooker et al., 2015; Forbes et al., 2004). Research examining specific parental resources (e.g., SES) have shown that infants in households with lower parental resources may predict higher negative self-regulation later in the infant's life (Brandes-Aitken et al., 2019). Thus, both mother and fathers' low parental resources were expected to be associated with higher infant negative affect regulation.

For fathers, an interaction between paternal psychopathology symptoms and parental resources predicting infant negative affect was expected (see Figure 2). Specifically, fathers' psychopathology symptoms were expected to be associated with infant negative affect only if parental resources was low. This coincides with Brandes-Aitken et al. (2019) study that found a specific component of parental resources (e.g., SES) was associated with higher infant negative self-regulation. Fathers low in parental resources may elevate the impact of psychopathology symptoms on infant negative affect. Father psychopathology symptoms were not expected to be associated with infant negative affect if parental resources was high. This is because it could be that higher parental resources might buffer infants from the father's psychopathology symptoms. There is very limited research in father psychopathology symptoms predicting infant affect and no research for parental resources predicting infant negative affect thus fathers' prediction is mainly exploratory. Overall, there may be differential predictors of infant negative affect with mothers versus fathers.

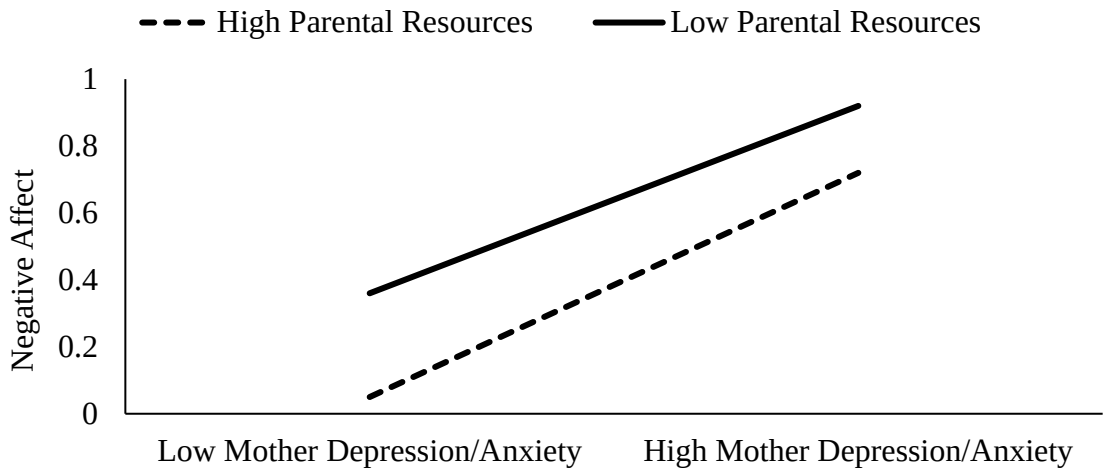

Figure 1: Prediction for Mother-infant Dyads for Hypothesis 2

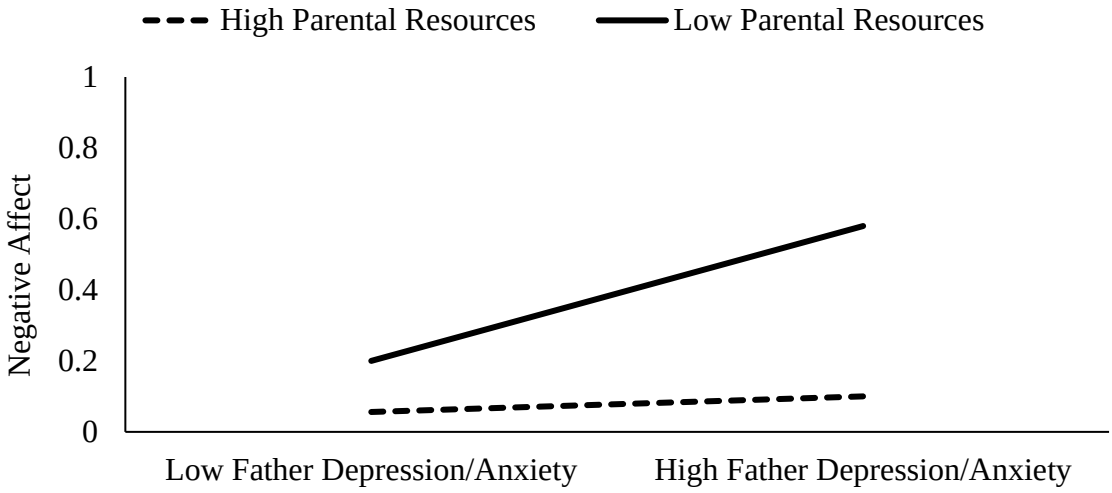

Figure 2: Prediction for Father-infant Dyads for Hypothesis 2

Method

Participants

The sample from this study was from a larger longitudinal study examining infant social and emotional development. The families visited the laboratory three times when the infant is 4-, 6-, and 8-months (+/1 14 days) of age. This study used data from the 4-month and 8-month visits. The overall sample consisted of 98 families (59.6% male

infant). The participants were recruited through various flyers and advertisements at local infant events and infant classes in Bowling Green, Kentucky. The infant must have been full-term with no health complications. Both parents must have been available to participate and either married or co-parenting. Both parents also needed to be able to read and understand English. Families were compensated $20 cash for each visit completed ($60 maximum). The larger, longitudinal study has been reviewed and approved by Western Kentucky University's Institutional Review Board (See Appendix A for IRB approval).

The majority of parents were predominately European American (mothers: 90.8%; fathers: 85.7%) and middle class (12.3% of families earned less than $29,999; 40.8% earned between $30,000 to $74,999; 41.8% earned between $75,000 to 149,999; and 5.1% earned above $150,000). The parents' ages were highly varied (mothers' age range = 19-44 years; mothers: M = 30.37; SD = 5.25; fathers' age range = 19-55 years; fathers: M = 32.39, SD = 6.67). Parents' education levels were varied, but the majority completed at least some college (4.1% of mothers and 14.3% of fathers reported some high school or completed high school, 1% of mothers and fathers completed trade school, 52% of mothers and fathers reported having some college or completed an associates/bachelors degree, and 42.9% of mothers and 32.7% of fathers reported some graduate/professional training or completed graduate/professional school). Parents were also predominately married (90.8%) and about half were first-time parents (53.8%). The overall families were a relatively low-risk community sample.

From the total sample of 98 families, 75 families completed the study. The attrition rate was moderate (23.5%). Statistical comparisons for demographic variables

(e.g., infant gender, parent age, parent education, parent ethnicity, and family income) between the completed sample (n = 75) and sample that dropped out (n = 23) were examined. Two significant demographic differences were revealed. Mothers in the present study had a higher education level compared to mothers who did not complete the study (t (96) = -2.26, p = .03, Cohen's d = 1.80; Mothers completed: M = 8.47, SD = 1.71 vs. Mothers dropped: M = 7.52, SD = 2.06). Fathers who completed the study were also more educated (t (96) = -2.65, p = .01, Cohen's d = 2.30; Fathers completed: M = 7.93, SD = 2.13 vs. Fathers dropped: M = 6.52, SD = 2.74) than fathers who did not complete the study. Overall, the portion of the sample who completed the study had higher parent education levels compared to those who did not complete the study.

At the 4-month time-point, 79 families had complete data, 4 families were missing questionnaire data, 4 families were missing observational data, and 1 family was missing questionnaire and observational data. At the 8-month time-point, 66 families had observational data examined in the current study. Due to COVID-19, 3 additional families at 4-months and 4 additional families at 8-months did not have observational data. Overall, 61 mother-infant dyads and 58 father-infant dyads had complete data at 4 and 8-months. Subsequent analyses utilized all available data.

Procedure

Parents were mailed a home questionnaire packet approximately 10-14 days before attending their laboratory session. Parents individually completed questionnaires about infant temperament, marital satisfaction, depression and anxiety symptoms (Inventory of Depression and Anxiety Symptoms, IDAS, Watson et al., 2007), and parental involvement. The parents brought the questionnaires to their laboratory session.

Upon delivery to the laboratory, questionnaire packets were screened by a research assistant for completeness and certain items on the IDAS questionnaire pertaining to self-harm or suicidal thoughts were flagged for high scores. If a high score was found in these certain questions, a list of resources available within Warren County were provided.

Upon arrival to the first laboratory visit, informed consent was obtained. Parents also participated in a demographic interview, and individually completed a short laboratory questionnaire packet assessing parent personality, another measure of parental involvement, and parenting efficacy. A lead research assistant also instructed the parents on electrode placement for themselves and their infant in order to acquire cardiac physiology, which is not being examined in the current study. Parents were randomly assigned to go first or second in the SFP with their infant.

The first parent entered the testing room with the infant and sat in a chair with his/her infant on his/her lap for 3 minutes in order to get a baseline for cardiac recording. The parent and infant then completed three episodes of the Still-Face Paradigm (SFP; Tronick et al., 1978). The Still-Face Paradigm consisted of three episodes each lasting 90-seconds. In the first play episode, the parent interacted normally with his/her infant. In the second still-face episode, the parent stopped interacting with his/her infant and kept a neutral expression on his/her face. In the last episode, reunion, the parent went back to playing with his/her infant (Tronick et al., 1978). Lastly, another baseline reading took place for cardiac recording that lasted for 3 minutes. Once the first parent was finished, the other parent entered the testing room to complete the baseline assessment, SFP, and second baseline with the infant.

The parents individually completed additional tasks with their infant, including a

free-play and peek-a-boo. Observational measures of temperament were also obtained, including fear (masks) and frustration (modified gentle arm restraint; Planalp et al., 2017). If the infant become distressed (≥ 20 second of hard crying), the task ended early. Parents also chose to end tasks early at any time. All laboratory visits were audio/video recorded. Upon completion of the laboratory visit, the parents received their payment and a reminder about the next session (not applicable for the last session).

Measures

Parental Depression and Anxiety Symptoms. Parent depression and anxiety symptoms were assessed using Watson et al.'s (2007) Inventory of Depression and Anxiety Symptoms (IDAS). This 64 item self-report questionnaire assesses an individual's emotions and feelings that coincide with depression and anxiety. The format for each item is a 5-point Likert scale ranging from 1 meaning "Not at all" to 5 meaning "Extremely." The IDAS is comprised of subscales that include: general depression, dysphoria, lassitude, insomnia, suicidality, appetite loss/gain, ill temper, well-being, social anxiety, panic, and traumatic intrusions.

The current study focused on the general depression (20 items, 2 items reverse coded) and social anxiety (5 items) subscales. The general depression subscale is comprised of questions about an overall negative outlook on one's life and feelings of sadness and hopelessness. Sample items that assess depression symptoms included, "I had little interest in my usual hobbies or activities" and "I felt exhausted" (Watson et al., 2007). The social anxiety subscale pertained to questions about social performance and interaction. Sample items include "I felt faint" and "I felt self-conscious knowing that others were watching me" (Watson et al., 2007). Parent responses from each of the items

were averaged between each parent to create the corresponding subscale scores. The general depression and social anxiety subscales separately created for mothers and fathers by averaging the corresponding items. High scores indicated increased levels of general depression (possible range = 20-100) and social anxiety (possible range = 5-25) symptoms.

The IDAS is a valid and reliable measure of depression and anxiety symptoms (Watson et al., 2007; Watson et al., 2008). A study by Watson et al. (2008) examined the correlation between the IDAS and the Structured Clinical Interview for DSM-IV (SCID-IV) and noted a .62 correlation for general depression in the IDAS and major depression disorder in the SCID-IV. They also noted a .37 correlation between the IDAS general depression and the SCID-IV general anxiety diagnosis. Watson et al. (2008) examined the correlation between the IDAS measure for social anxiety and the SCID-IV measurement for social phobia and found a .31 correlation as well as a .42 correlation with MDD. In the current study, Cronbach α scores for general depression were .87 for mothers and .90 for fathers. Cronbach α scores for social anxiety were .78 for mothers and .81 for fathers. Higher scores indicated higher general depression and social anxiety symptoms.

Infant Affect. Infant affect was rated by coders on a second-by-second basis for all three episodes of the SFP using an established coding scheme (Braungart-Rieker et al., 1998). The coding scheme includes infants' vocal and facial expression using a 7-point scale ranging from -3 (*extreme crying and/or screaming*), 0 (*neutral*), to 3 (*intense laughing and/or squeals of delight*). Coders were trained until they had reached inter-rater reliability (intraclass correlations (ICCS) ≥ .80). To avoid bias, coders did not rate

the same infant with both parents within the same age group (e.g., 4 and 8 months). In order to ensure the coders maintained reliability, coders overlapped on at least 20% of the overall videos within each time-point and drift reliability was ran. For the present study, only reunion was examined (reunion infant affect with mothers: 4-mos: ICC = .86; 8-mos: ICC = .94; with fathers: 4-mos: ICC = .94, 8-mos ICC = .94).

Negative, positive, and neutral affect proportion scores were calculated for each episode of the SFP separately with mothers and fathers (Braungart-Rieker et al., 2014). Proportion scores were calculated by dividing the sum of the number of times the specific affect appeared (positive, neutral, negative) by the total number of epochs for the individual within the corresponding episode (play, still-face, reunion). Therefore, the proportion scores reflect the proportion of time infants spent in positive, neutral, or negative affect during the SFP. Due to the overall research questions, infant negative affect during the reunion episode of the SFP was examined in subsequent analyses. High proportion scores indicated increased instances of negative infant affect.

Parental Resources. To assess parental resources, parents reported on their mother/father age, education level, occupation, and family income level at the 4-months demographic interview. Parents reported their age in years. Highest level of education was reported using different education levels ranging from 1 *(less than 9th grad*e) to 10 *(completed graduate/professional degree).* Parents reported his/her occupation (type of occupation, if applicable), which were then coded using the Socioeconomic Status of Index of Occupations (SEI; Entwisle & Astone, 1994; Lickenbrock & Braungart-Rieker, 2015). Possible scores ranged from 0 to 100 (Entwisle & Astone, 1994) and then averaged for both parents. In the event of only one parent currently employed, only

his/her score was to be used. In the current study, the highest SEI score for both mothers and fathers was 97.16 (e.g., Physician). The average score for mothers was 63.99 (SD = 17.39) whereas the lowest score was 29.03 (e.g., food preparation occupation). The average score for fathers was 58.25 (SD = 21.12) whereas the lowest score was 27.53 (e.g., cooks, except short order). Parents then reported their family income using a range of different income options from 1 *(less than $15,000)* to 11 *($150,000 or more).*

These items (mother age, father age, mother education level, father education level, average occupation score, and family income level) were then included in an exploratory factor analysis (Lickenbrock & Braungart-Rieker, 2015). Results revealed a 1-factor solution with an eigenvalue of 2.83 and factor loadings ranging from .46 to .82. Individual family factor scores were used in subsequent analyses. Higher factor scores reflected greater resources.

COVID-19

Given the events surrounding COVID-19, changes were implemented regarding the data collection of the larger study. The changes included postponing any in-person data collection (since March 2020) and mailing out questionnaire packets to the families during each time window. The questionnaire packet included the following: the home questionnaire packet, the laboratory questionnaire packet, the demographic questionnaire, and the informed consent forms (if applicable). Due to the lack of infant affect data, the current study only included data collected prior to the COVID-19 pandemic.

Results

Preliminary Analyses

Descriptive statistics (e.g., mean, standard deviation, minimum, maximum, skewness, and kurtosis) were ran in order to examine whether the data was normally distributed. Table 1 shows the descriptive statistics for the variables of interest. The variables were relatively normally distributed.

Table 1

Descriptive Statistics for Parent and Infant Variables.

Variable	*N*	*M (SD)*	Min	Max	Skewness	Kurtosis
Parental Resources	94	0.00 (1.00)	-2.62	1.67	-0.75	0.50
Mother						
1. General Depression	90	40.90 (9.92)	21.00	68.00	0.45	-0.17
2. Social Anxiety	90	7.79 (3.18)	5.00	23.00	2.18	6.97
3. Infant Neg. Affect	67	0.28 (0.36)	0.00	1.00	1.13	-0.38
Father						
4. General Depression	88	38.70 (10.92)	21.00	71.00	0.88	0.26
5. Social Anxiety	88	7.00 (2.98)	5.00	22.00	2.36	7.32
6. Infant Neg. Affect	66	0.27 (0.34)	0.00	1.00	1.27	0.09

Note: General depression, social anxiety, and parental resources were measured at 4-months, infant negative affect during the reunion was measured at 8 months.

Next, within-parent correlations were run for the variables of interest. Tables 2 and 3 show the within-parent correlations for mothers and fathers. Mothers' general depression was positively correlated with mothers' social anxiety; mothers who reported higher general depression symptoms also reported higher social anxiety symptoms. Infant negative affect at 8-months was associated with parental resources at 4-months; mothers

who reported higher parental resources had infants with higher infant negative affect. Fathers' general depression was also correlated with fathers' social anxiety. Fathers who reported higher general depression also reported higher social anxiety. Table 3 also shows a correlation between fathers' general depression and parental resources. Fathers who reported higher general depression symptoms also reported lower parental resources.

Table 2

Mother Within-Parent Correlations

Variable	1.	2.	3.	4.
1. Mother General Depression	1.00			
2. Mother Social Anxiety	0.50**	1.00		
3. Mother Infant Neg. Affect	0.11	-0.09	1.00	
4. Parental Resources	-0.16	0.12	0.32**	1.00

Note: General depression and social anxiety were measured at 4-months, infant negative affect was measured at 8 months. $^{**}p < .01$.

Table 3

Father Within-Parent Correlations

Variable	1.	2.	3.	4.
1. Father General Depression	1.00			
2. Father Social Anxiety	0.39**	1.00		
3. Father Infant Neg. Affect	0.02	0.06	1.00	
4. Parental Resources	-0.23*	-0.13	0.07	1.00

Note: General depression and social anxiety were measured at 4-months, infant negative affect was measured at 8 months. $^{*}p <. 05$. $^{**}p < .01$.

Between-parent correlations were also run to examine mother and father data together. Table 4 shows a positive association between father' general depression with mothers' general depression and mothers' social anxiety. Fathers who reported higher general depression symptoms had their spouses report higher general depression and social anxiety symptoms.

Test of covariates (e.g., t-tests and analysis of variance; ANOVA) were ran to examine demographic variables (i.e., parent order of who went first during the SFP, infant gender, parity, marital status, and parent ethnicity) with the study variables. A total of 35 different t-tests were ran and a total of 7 different one-way ANOVAs were ran, which resulted in no significant patterns of findings except for parent order at 8-months. Parent order for mothers and fathers for infant negative affect at 8-months were significant (Mother: $p < .001$; Father $p = .007$). Infant negative affect at 4-months was also included as a covariate.

Table 4

Between-Parent Correlations

Variable	Father General Depression	Father Social Anxiety	Father Infant Neg. Affect
Mother General Depression	0.28**	0.02	-0.004
Mother Social Anxiety	0.35**	0.04	-0.08
Mother Infant Neg. Affect	-0.22	0.09	0.19

Note: General depression and social anxiety were measured at 4-months, infant negative affect was measured at 8 months. **$p < .01$.

Moderator Analyses

The first hypothesis stated that parental resources will act as a moderator between parental psychopathology symptoms at infants age of 4-months and infant negative affect

at 8-months. A series of hierarchical multiple regression models were run in order to examine whether parental resources moderated the association between parent psychopathology at 4-months and infant negative affect at 8-months. Step one included the main effects of parental psychopathology, parental resources, and infant negative affect at 4-months as well as parent-order at 8-months. Step two included the main effects and parent psychopathology X parental resources interaction. Due to the small sample size, these regression models were ran separately for each parent psychopathology symptom (e.g., depression and social anxiety) by mother-infant and father-infant data. Therefore, a total number of 4 hierarchical multiple regression models were run examining whether parental resources moderated the association between parental psychopathology symptoms (e.g., depression and social anxiety) and infant negative affect during the reunion episode of the SFP.

The second hypothesis stated that there would be differential predictors of infant affect for mothers versus fathers. The results from the hierarchical regression models predicting parental resources revealed two significant main effects involving the parental resource variable (See Table 5). Mothers who reported higher parental resources at 4-months predicted higher infant negative affect at 8-months even after controlling for infant negative affect at 4-months and parent order at 8-months. Similar findings were found when examining social anxiety at 4-months. Once a 2-way interaction was included in the regression model, it was no longer significant. Overall, results showed main effects only for parental resources and infant negative affect for mothers.

In addition, parental resources did not moderate the effects of both mother and father psychopathology symptoms at 4-months and infant negative affect at 8-months.

Similar hierarchal regression models were run for fathers. The results revealed no significant findings for fathers.

Table 5

Mother Psychopathology Symptoms and Parental Resources at 4-months Predicting Infant Negative Affect at 8-months (n = 61)

Variables	Mothers: 4 Months→8 Months						
Reunion	*B(SE)*	*B*	*p*	*df*	*F*	R^2	ΔR^2
			.003	4	4.48	.24	
Parental Resources	.15 (.05)	.34	.01				
General Depression	.004 (.01)	.10	.38				
Parent Order	-.27 (.09)	-.35	.004				
Infant Negative Affect	.06 (.12)	.06	.63				
Reunion							
			.01	4	4.24	.23	
Parental Resources	.15(.05)	.33	.01				
Social Anxiety	-.003 (.02)	-.03	.84				
Parent Order	-.27 (.09)	-.35	.004				
Infant Negative Affect	.06 (.12)	.06	.61				

Note: Parental Resources: Mothers parental resources at 4 months averaged across mothers and fathers; General Depression: Mothers general depression scores at 4 months; Social Anxiety: Mothers social anxiety scores at 4 months; Parent Order: Parent order at 8 months across mothers and fathers; Infant Negative Affect: Infant negative affect proportion scores at 4 months; Interaction Models were non-significant; Predictor variables were mean-centered

Exploratory Analyses

As an exploratory analysis, each individual component of parental resources (i.e., parent age, parent occupation, parent education level, and SES) was examined in separate multiple regression models in order to examine the associations between the study variables more on a fine-grained level. Similar to the previous models, parent order at 8-months and infant affect at 4-months were also controlled. A total of 16 hierarchical regression models were ran.

Results from the hierarchical regression models predicting parental resources separately revealed three significant main effects for mothers (See Table 6). Mothers who had a higher age at 4-months had infants with higher infant negative affect at 8-months for both depression and social anxiety models. In addition, mothers who reported higher levels of education at 4-months had infants with higher levels of infant negative affect at 8-months. All interaction models were non-significant. Significant findings were not found for mothers' occupation level and family income models.

Exploratory analyses with father data revealed two significant main effects (See Table 7). Similar to mother findings, fathers who reported higher education levels at 4-months had infants with higher levels of infant negative affect at 8-months. Similar main effects were revealed when examining for social anxiety symptoms at 4-months. Similar to mother models, the interaction models were non-significant. Models including fathers' age, occupation level and family income were also non-significant.

Table 6

Mother Psychopathology Symptoms, Mothers Age, and Education Level at 4-months Predicting Infant Negative Affect at 8-months (n = 62)

Model Variables	Mothers: 4 Months→8 Months						
Reunion	*B(SE)*	*B*	*P*	*Df*	*F*	R^2	ΔR^2
			.007	4	3.93	.22	
Mother Age	.02 (.01)	.30	.01				
General Depression	.002 (.01)	.05	.69				
Parent Order	-.23 (.09)	-.29	.02				
Infant Negative Affect	.07 (.12)	.07	.57				
Reunion							
			.007	4	3.93	.22	
Mother Age	.02 (.01)	.30	.01				
Social Anxiety	-.01 (.01)	-.05	.68				
Parent Order	-.23 (.09)	-.29	.02				
Infant Negative Affect	.07 (.12)	.07	.55				
Reunion							
			.01	4	3.44	.19	
Mother Education	.05 (.03)	.26	.04				
General Depression	.01 (.01)	.14	.26				
Parent Order	-.27 (.09)	-.35	.01				
Infant Negative Affect	.04 (.12)	.04	.77				

Note: Mother age: Mothers' age at 4 months; Mother Education Level: Mothers' education level at 4-months; General Depression: Mothers general depression scores at 4 months; Social Anxiety: Mothers social anxiety scores at 4 months; Parent Order: Parent order at 8 months across mothers and fathers; Infant Negative Affect: Infant negative affect proportion scores at 4 months; Interaction Models were non-significant; Predictor variables were mean-centered.

Table 7

Father Psychopathology Symptoms and Education Level at 4-months Predicting Infant Negative Affect at 8-months (n = 59)

Model Variables	Fathers: 4 Months→8 Months						
Reunion	*B(SE)*	*B*	*P*	*Df*	*F*	R^2	ΔR^2
			.03	4	2.90	.18	
Father Education	.07 (.03)	.38	.01				
General Depression	.01 (.004)	.21	.14				
Parent Order	-.21 (.01)	-.29	.03				
Infant Negative Affect	.36 (.14)	.36	.01				
Reunion							
			.03	4	2.89	.18	
Father Education	.06 (.03)	.34	.02				
Social Anxiety	.02 (.01)	-.19	.14				
Parent Order	-.19 (.09)	-.27	.04				
Infant Negative Affect	.33 (.14)	.33	.02				

Note: Father Education Level: Fathers' education level at 4-months; General Depression: Fathers general depression scores at 4 months; Social Anxiety: Fathers social anxiety scores at 4 months; Parent Order: Parent order at 8 months across Fathers and fathers; Infant Negative Affect: Infant negative affect proportion scores at 4 months; Interaction Models were non-significant; Predictor variables were mean-centered

Discussion

The purpose of the current study was to examine whether various sources of stress in parents, specifically psychopathology symptoms and parental resources, were associated with infant affect regulation with mothers and fathers. This study was one of few to examine predictors of infant affect regulation with fathers. Results involving

parental resources revealed a significant main effect of parental resources at 4-months with infant negative affect with mothers at 8-months. No significant findings were revealed for maternal psychopathology as well as the father models. Follow-up exploratory analyses examining the individual components of the parental resource variable found significant findings for mother age as well as both mother and father education level. Specifically, these variables at 4-months significantly predicted increased infant negative affect at 8-months. Overall, the results showed interesting findings in the associations between parental resources (and components of parental resources) and infant negative affect.

Parent Psychopathology Symptoms

Parent psychopathology symptoms were not found to be significantly associated with infant negative affect regulation with mothers and fathers in the present study. This is counter to previous research that reported young infants showed higher negative affect with mothers and fathers who were high in depressive and anxiety symptoms (Brooker et al., 2015; Forbes et al., 2004). Even though the present study found that some parents scored higher in general depression and/or anxiety symptoms, this was a low-risk community sample with parents exhibiting predominately low to moderate in both parental general depression and social anxiety symptoms. Previous studies tended to examine higher-risk clinical populations (e.g., Reck et al., 2018), which might explain the discrepancy in findings.

Another potential reason for the discrepancy in findings between past studies and the current study is the difference in how parent psychopathology was measured. The current study examined parent psychopathology on a symptom level using the Inventory

of Depression and Anxiety Symptoms (IDAS; Watson et al., 2007). Previous studies measured psychopathology either by symptoms (e.g., Brooker et al., 2015) or clinical diagnosis (e.g., Forbes et al., 2004). A study by Forbes et al. (2004) measured depression using the Center for Epidemiological Study Depression Scale and the Structured Clinical Interview for Axis I DSM-IV Disorders in a sample of parents who had a history of major depression disorder and clinical levels of depression. They found that infants who parents had a history of clinical depression were more likely to show more negative affect during the SFP than infants whose parents did not have a history of clinical depression (Forbes et al., 2004). Moreover, previous studies examined parental general anxiety in association with infant affect (Brooker et al., 2015; Reck et al., 2018), whereas the present study examined parent social anxiety symptoms. Thus, there may be a difference in the impact of parent anxiety symptoms on infant affect if it is social or general anxiety. Future studies should examine past histories of clinical depression and anxiety in combination with symptoms, as well as the extent to which parent general anxiety and social anxiety in parents are associated with infant negative affect.

Parental Resources

Results from the current study differed from previous research that examined associations between various individual components of parental resources and infant emotion regulation. The present results showed that mothers with higher parental resources was associated with higher infant negative affect. Yet, a study by Brandes-Aitken et al. (2019) found lower SES was associated with higher infant negative self-regulation. A possible reason for the present results would be infants showing higher negative affect during the reunion episode due to being distressed during the still-face

episode. The increase in negative affect might have carried over from the slightly stressful still-face episode. This may be due to how responsive the parents are towards their infant during this age period (Braungart-Rieker et al., 2014). Attachment is theorized to be developing during the 4- through 8-month time period, but is not fully developed until later in infancy (Braungart-Rieker et al., 2014). Infants who later developed a more ambivalent attachment showed a decrease in self-comforting after the still-face episode with fathers (Braungart-Rieker et al., 2014). Future studies should include parenting behaviors and the parent-infant attachment relationship as additional contexts in the development of infant affect regulation.

In addition, studies examining fathers in relation to infant/child emotional development observed differences in paternal stress levels depending on their level of parental resources (Brandes-Aitken et al., 2019; Strazdins et al., 2010). However, the present study did not reveal any significant findings for father models including psychopathology symptoms or parental resources. Studies have noted no significant differences in infant negative affect with mothers and fathers (Braungart-Rieker et al., 1998; Forbes et al., 2004). Future research should examine if there may be better predictors that are associated with fathers for infant negative affect.

Exploratory Analyses Results

Follow-up exploratory analyses were run to examine each resource individually (i.e., parent age, education level, occupation, and SES) as a moderator between parent psychopathology symptoms and infant negative affect with mothers and fathers. The results found significant main effects for mother age as well as mother and father education level being associated with infant negative affect regulation. Specifically,

mothers who were older and parents with higher education had infants who were higher in negative affect during the reunion episode of the SFP.

This is counter to previous research finding less resources to be associated with increased infant negative affect. Bornstein et al. (2006) found that younger mothers had difficulty adapting to parenting challenges and thus had more parental stress compared to older mothers. Moreover, Stazdins et al. (2010) found that fathers who had less education had children who had more difficulties with emotion regulation. No previous studies have revealed a negative correlation between high parent education and infant negative affect. Future research should further examine associations between high parent education and infant negative affect.

Additional parenting variables (e.g., parent sensitivity) could be examined in combination with parent age, parent education and infant negative affect for future research. More specifically, parental sensitivity may moderate the association between parent age/education and infant negative affect. Parents who were older were associated with having higher parental sensitivity than younger parents (NICHD ECCRN, 2000; Stacks et al., 2014). Fathers tended to be rated more sensitive if they were older in age (NICHD ECCRN, 2000). There may be an association between parent sensitivity, parent age, and infant affect. Moreover, having higher education was associated with more parental sensitivity (Tamis-LeMonda et al., 2004). Both mothers and fathers who had higher education were seen more as sensitive than parents with lower education (Tamis-LeMonda et al., 2004). Both mother and father sensitivity were also related to infant affect (Braungart-Rieker et al., 2014). Thus, it may be beneficial to examine parental sensitivity in addition to parent age and parent education to predict infant affect.

Study Limitations, Implications, and Conclusions

There are limitations for the current study. Results need to be interpreted with caution due to the small sample size. Due to the COVID pandemic, observational data (e.g., infant affect) could not be collected in the laboratory for 7 families. In addition, the current study only examined infant negative affect during the reunion episode of the SFP. Previous research has examined infant negative affect either during all episodes of the SFP or the still-face and reunion episodes (e.g., Braungart-Rieker et al., 2014; Forbes et al., 2004). It is entirely possible that parental resources and parent psychopathology symptoms might account for changes in infant negative affect between SFP episodes rather than just infant negative affect during the reunion episode. Lastly, the majority of families who participated were also predominately low/moderate in psychopathology symptoms and higher in parental resources. Future research should include community families with a diverse range of parental resources and psychopathology symptoms.

Despite the limitations, the results from the study suggests several theoretical and practical implications. First, the current study was the first to examine parental psychopathology and parental resources together in association with infant affect with mothers and fathers. The sample was a high functioning community sample with parents having higher parental resources and low to moderate psychopathology symptoms. It is useful to also examine families who may not have debilitating psychopathology symptoms and/or who have higher parental resources in relation to infant emotional development. Second, the main finding of parental resources being associated with infant negative affect with mothers helps shine a light on possible issues that are not thought of for parents who have more resources. More specifically, there may be different stressors

for parents who have higher resources compared to parents who have fewer resources for parenting at their disposable. Lastly, results from the current study can be used to develop intervention programs for parents who have various types of personal and family stress.

In terms of future directions, it would be useful to collect samples that have more variability in parental resources as well as parent psychopathology symptoms. Examining parents with clinical diagnosis of depression and/or anxiety (i.e., general anxiety and social anxiety) may also lead to different results (Forbes et al., 2004; Reck et al. 2018). It also may be useful to examine parental sensitivity in combination with psychopathology symptoms and parental resources to better predict infant negative affect (NICHD ECCRN, 2000; Stacks et al., 2014; Tamis-LeMonda et al., 2004). The current study used the Inventory of Depression and Anxiety Symptoms (IDAS; Watson et al., 2007) to examine general depression and social anxiety symptoms. However, this measure also includes additional psychopathology symptoms (e.g., panic, traumatic intrusions). Other forms of psychopathology symptoms might be more highly associated with parental resources and infant negative affect in a high-functioning community sample than general depression and social anxiety. Thus, future research should explore the extent to which additional psychopathology symptoms are associated with parental resources and infant negative affect. Lastly, future studies should examine infant negative affect change scores from the still-face and reunion episode. Overall, the results from the present study shows potential next steps for future research to further examine with parent psychopathology symptoms, parental resources, and infant affect.

Overall, this study highlights the importance of examining various sources of stress in parents as predictors for infant affect regulation. More research is needed on this

topic. It also contributes to the growing body of research on mothers' and fathers' impact on children's emotional development. The present study can be seen as first steps towards integrating more research examining both mother and father sources of stress and their impact on infants' emotional development.

References

Adamson, L. B., & Frick, J. E. (2003). The still face: A history of a shared experimental paradigm. *Infancy, 4,* 451-472. doi: 10.1207/S15327078IN0404_01

Ahmadi Doulabi, M., Sajedi, F., Vameghi, R., Mazaheri, M. A., & Akbarzadeh Baghban, A. (2017). Socioeconomic status index to interpret inequalities in child development. *Iranian Journal of Child Neurology. 11,* 13-25. doi: 10.22037/ijcn.v11i2.11688

American Psychiatric Association. (2013*). Diagnostic and statistical manual of mental disorders: DSM-5* (Fifth edition.). Arlington, VA: American Psychiatric Association.

Braungart-Rieker, J., Garwood, M. M., Powers, B. P., & Notaro, P. C. (1998). Infant affect and affect regulation during the Still-Face Paradigm with mothers and fathers: The role of infant characteristics and parental sensitivity. *Developmental Psychology, 34,* 1428–1437. doi: 10.1037//0012-1649.34.6.1428

Braungart-Rieker, J. M., Garwood, M. M., Powers, B. P., & Wang, X. (2001). Parental sensitivity, infant affect, and affect regulation: Predictors of later attachment. *Child Development, 72,* 252-270. doi: 0009-3920/2001/7201-0016

Braungart-Rieker, J. M., Zentall, S., Lickenbrock, D. M., Ekas, N. V., Oshio, T., & Planalp, E. (2014). Attachment in the making: Mother and father sensitivity and infants' responses during the Still-Face Paradigm. *Journal of Experimental Child Psychology, 125,* 63–84. doi: 10.1016/j.jecp.2014.02.007

Bornstein, M. H., Putnick, D. L., Suwalsky, J. T. D., & Gini, M. (2006). Maternal chronological age, prenatal and perinatal history, social support, and parenting of

infants. *Child Development, 77*, 875-892. doi: 10.1111/j.1467-8624.2006.00908.x

Brandes-Aitken, A., Braren, S., Swinger, M., Voegtline, K., & Blair, C. (2019). Sustained attention in infancy: A foundation for the development of multiple aspects of self-regulation for children in poverty. *Journal of Experimental Child Psychology, 184*, 192-209. doi: 10.1016/j.jecp.2019.04.006

Brooker, R. J., Neiderhiser, J. M., Leve, L. D., Shaw, D. S., Scaramella, L. V., & Reiss, D. (2015). Associations between infant negative affect and parent anxiety symptoms are bidirectional: Evidence from mothers and fathers. *Frontiers in Psychology, 6*, 1875 doi: 10.3389/fpsyg.2015.01875

Browne, D.T., & Leckie, G. (2016). Observed sensitivity during family interactions and cumulative risk: A study of multiple dyads per family. *Developmental Psychology, 7*, 1128-1138. doi: 10.1037/dev0000143

Busseri, M. A., & Sadava, S. W. (2011). A review on the tripartite structure of subjective well-being: Implications for conceptualization, operationalization, analysis, and synthesis. *Personality and Social Psychology Review, 15*, 290-314. doi: 10.1177/1088868310391271

Cohn, J. F., Campbell, S. B., Matias, R., & Hopkins, J. (1990). Face-to-face interactions of postpartum depressed and nondepressed mother-infant pairs at 2 months. *Developmental Psychology, 26*, 15–23. doi: 10.1037/0012-1649.26.1.15

Davison, K. K., Charles, J. N., Khandpur, N., & Nelson, T. J. (2016). Fathers' perceived reasons for their underrepresentation in child health research and strategies to increase their involvement. *Maternal and Child Health Journal, 21*, 267–274. doi: 10.1007/s10995-016-2157-z

DiCorcia, J. A., Snidman, N., Sravish, A. V., & Tronick. (2016). Evaluating the nature of the still-face effect in the double face-to-face still-face paradigm using different comparison groups. *Infancy, 21,* 332-352. doi: 10.1111/infa.12123

Dollar, J. M., & Buss, K. A. (2014). Approach and positive affect in toddlerhood predict early childhood behavior problems. *Social Development, 23,* 267-287. doi: 10.1111/sode.12062

Ekas, N. V., Haltigan, J. D., & Messinger, D. S. (2013). The dynamic still-face effect: Do infants decrease bidding over time when parents are not responsive? *Developmental Psychology, 49,* 1027-1035. doi: 10.1037/a0029330

Entwisle, D. R., & Astone, N. M. (1994). Some practical guidelines for measuring youth's race/ethnicity and socioeconomic status. *Child Development, 65(6),* 1521-1540. doi:10.2307/1131278

Feldman, R. (2007). Parent-infant synchrony and the construction of shared timing; physiological precursors, developmental outcomes, and risk conditions. *Journal of Child Psychology and Psychiatry, 48,* 329-354. doi: 10.1111/j.1469-7610.2006.01701.x

Field, T., Hernandez-Reif, M., Diego, M., Feijo, L., Vera, Y., Gil, K., & Sanders, C. (2007). Still-face and separation effects on depressed mother-infant interactions. *Infant Mental Health Journal, 28*, 314–323. doi: 10.1002/imhj.20138

Field, T. (2010). Postpartum depression effects on early interactions, parenting, and safety practices: A review. *Infant Behavior and Development, 33,* 1-6. doi: 10.1016/j.infbeh.2009.10.005

Forbes, E. E., Cohn, J. F., Allen, N. B., & Lewinsohn, P. M. (2004). Infant affect during

parent-infant interaction at 3 and 6 months: Differences between mothers and fathers and influence of parent history of depression. *Infancy, 5*, 61–84. doi: 10.1207/s15327078in0501_3

Graham, K. A., Blissett, J., Antonioiu, E. E., Zeegers, M. P., & McCleery, J. P. (2018). Effects of maternal depression in the Still-Face Paradigm: A meta-analysis. *Infant Behavior and Development, 50*, 154–164. doi: 10.1016/j.infbeh.2017.12.001

Grant, K.-A., McMahon, C., Reilly, N., & Austin, M. P. (2010). Maternal sensitivity moderates the impact of prenatal anxiety disorder on infant responses to the still-face procedure. *Infant Behavior and Development, 33*, 453–462. doi: 10.1016/j.infbeh.2010.05.001

Holzman, J. B., Burt, N. M., Edwards, E. S., Rosinski, L. D., & Bridgett, D. J. (2018). Negative (but not positive) parenting interacts with infant negative affect to predict infant approach: Evidence of diathesis-stress. *Infancy, 23*, 471-480. doi: 10.1111/infa.12223

Ierardi, E., Ferro, V., Trovato, A., Tambellli, R., & Crugnola, C. R. (2019). Maternal and paternal depression and anxiety: Their relationship with mother-infant interactions at 3 months. *Archives of Women's Mental Health. 22*, 527-533. doi: 10.1007/s00737-018-0919-x

Joshanloo, M., & Bakhshi, A. (2016). The factor structure and measurement invariance of positive and negative affect. *European Journal of Psychological Assessment, 32*, 265-272. doi: 10.1027/1015-5759/a000252

Lickenbrock, D. M., & Braungart-Rieker, J. M. (2015). Examining antecedents of infant attachment security with mothers and fathers: An ecological systems perspective.

Infant Behavior and Development, 39, 173–187. doi: 10.1016/j.infbeh.2015.03.003

Lin, Y., & Seo, D. (2017). Cumulative family risks across income levels predict deterioration of children's general health during childhood and adolescence. *Plos One, 12, e0177531*. doi: 10.1371/journal.pone.0177531

Luoma, I., Puura, K., Mäntymaa, M., Latva, R., Salmelin, R., & Tamminen, T. (2013). Fathers' postnatal depressive and anxiety symptoms: An exploration of links with paternal, maternal, infant and family factors. *Nordic Journal of Psychiatry, 67*, 407-413. doi: 10.3109/08039488.2012.752034

Malatesta, C. Z., & Haviland, J. M. (1982). Learning Display Rules: The Socialization of Emotion Expression in Infancy. *Child Development, 53*, 991-1003. doi: 10.2307/1129139

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*, 1410–1418. doi: 10.1111/j.1469-7610.2009.02166.x

Mesman, J., Ijzendoorn, M. H. V., & Bakermans-Kranenburg, M. J. (2009). The many faces of the Still-Face Paradigm: A review and meta-analysis. *Developmental Review, 29*, 120–162. doi: 10.1016/j.dr.2009.02.001

Moore, G. A., Cohn, J. F., & Campbell, S. B. (2001). Infant affective responses to mothers still face at 6 months differentially predict externalizing and internalizing behaviors at 18 months. *Developmental Psychology, 37,* 706–714. doi: 10.1037//0012-1649.37.5.706

NICHD Early Child Care Research Network. (2000). Factors associated with fathers'

caregiving activities and sensitivity with young children. *Journal of Family Psychology, 14,* 200–219. doi. 10.1037/0893-3200.14.2.200.

Parent, J., Forehand, R., Pomerantz, H., Peisch, V., & Seehuus, M. (2017). Father participation in child psychopathology research. *Journal of Abnormal Child Psychology, 45,* 1259-1270. doi: 10.1007/s10802-016-0254-5

Planalp, E. M., Van Hulle, C., Gagne, J. R., & Goldsmith, H. H. (2017). The infant version of the Laboratory Temperament Assessment Battery (Lab-TAB): Measurement properties and implications for concepts of temperament. *Frontiers in Psychology, 8,* 846. doi: 10.3389/fpsyg.2017.00846

Putnam, S.P., & Stifter, C. A. (2002). Development of approach and inhibition in the first year: Parallel findings from motor behavior, temperament ratings and directional cardiac response. *Developmental Science, 5,* 441-451. doi: 10.1111/1467-7687.00239

Reck, C., Tietz, A., Müller, M., Seibold, K., & Tronick, E. (2018). The impact of maternal anxiety disorder on mother-infant interaction in the postpartum period. *Plos One, 13,* e0194763. doi: 10.1371/journal.pone.0194763

Sethna, V., Murray, L., Netsi, E., Lamprini, P., & Ramchandani, P. G. (2015). Paternal depression in the postnatal period and early father-infant interactions. *Parenting: Science and Practice, 15,* 1-8. doi: 10.1080/15295192.2015.992732

Stackes, A. M., Muzik, M., Wong, K., Majorie, B., Huth-Bocks, A., Irwin, J. L., & Rosenblum, K. L. (2014). Maternal reflective functioning among mothers with childhood maltreatment histories: links to sensitive parenting and infant

attachment security. *Attachment & Human Development, 16,* 515-533. doi: 10.1080/14616734.2014.935452

Strazdins, L., Shipley, M., Clements, M., Obrien, L. V., & Broom, D. H. (2010). Job quality and inequality: Parents' jobs and children's emotional and behavioural difficulties. *Social Science & Medicine, 70,* 2052-2060. doi: 10.1016/j.socscimed.2010.02.041

Sullivan, M. W. (2014). Infant expressions in an approach/withdrawal framework. *The Journal of Genetic Psychology, 175,* 472-493. doi: 10.1080/00221325.2014.964169

Taipale, J. (2016). Self-regulation and beyond: Affect regulation and the infant–caregiver dyad. *Frontiers in Psychology, 7,* 889. doi: 10.3389/fpsyg.2016.00889

Tamis-LeMonda, C. S., Shannon, J. D., Cabrera, N. J., & Lamb, M.E. (2004). Fathers and mothers at play with their 2- and 3-year-olds: Contributions to language and cognitive development. *Child Development, 75,* 1806–1820. doi: 10.1111/j.1467-8624.2004.00818.x

Tronick, E., Als, H., Adamson, L., Wise, S., & Brazelton, T. B. (1978). Infants response to entrapment between contradictory messages in face-to-face interaction. *Journal of the American Academy of Child and Adolescent Psychiatry, 17,* 1–13. doi: 10.1016/s0002-7138(09)62273-1./

Watson, D., Ohara, M. W., Simms, L. J., Kotov, R., Chmielewski, M., Mcdade-Montez, E. A., & Stuart, S. (2007). Development and validation of the Inventory of Depression and Anxiety Symptoms (IDAS). *Psychological* Assessment, *19,* 253–268. doi: 10.1037/1040-3590.19.3.253

Watson, D., Ohara, M. W., Chmielewski, M., Mcdade-Montez, E. A., Koffel, E., Naragon, K., & Stuart, S. (2008). Further validation of the IDAS: Evidence of convergent, discriminant, criterion, and incremental validity. *Psychological Assessment, 20*, 248–259. doi: 10.1037/a0012570

APPENDIX A

IRB Approval

WESTERN KENTUCKY UNIVERSITY

Institutional Review Board
Continuing Review Report

If this is your third year for your Continuing Review Request, please complete a new application.
~~Otherwise:~~ DO NOT include the complete application in describing modifications and requests for additional time to collect data.

Name of Project: The development of emotion regulation within the parent-infant relationship: Intrinsic and extrinsic contributors

Name of Researcher: Diane M. Lickenbrock, Ph.D.
Department: Psychological Sciences

How many total subjects have participated in the study since its inception? # 98

How many subjects have participated in the project since the last review? # 3 families since March, some are still in the process of completing the study

Is your data collection with human subjects complete? ☐ **Yes** ☒ **No**

1. Has there been any change in the level of risks to human subjects? (If "Yes", ~~please~~ explain changes on a separate page). ☐ Yes ☒ No

2. Have informed consent procedures changed so as to put subjects above minimal risk? (If "Yes", please describe on a separate page). ☐ Yes ☒ No

3. Have any subjects withdrawn from the research due to adverse events or any unanticipated risks/problems? (If "Yes", please describe on a separate page). ☐ Yes ☒ No

4. Have there been any changes to the source(s) of subjects and the Selection criteria? (If "Yes", please describe on a separate page). ☐ Yes ☒ No

5. Have there been any changes to your research design that were not specified in your application, including the frequency, duration and location of each procedure. (If "Yes", please describe on a separate page). ☒ Yes ☐ No

6. Has there been any change to the way in which confidentiality of the Data is maintained? (If "Yes", please describe on a separate page). ☒ Yes ☐ No

7. Is there desire to extend the time line of the project? ☒ Yes ☐ No
   On what date do you anticipate data collection with human subjects to be completed? 10/31/2021

WKU IRB# 19-134
Approval - 10/16/2020
End Date - 10/16/2021
Full Board
Original - 2/28/2013