A Dissertation
Submitted to the Faculty
of
Xavier University
in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Psychology
by
Angelique R. Teeters, M.A.
June 19, 2012

Approved:

Karl W. Stuckenberg, Ph.D., ABPP
Chair, Department of Psychology

Nicholas Salsman, Ph.D., ABPP
Assistant Professor of Psychology
Effects of Childhood Maltreatment History on Maternal Sensitivity to Infant Facial Expressions of Emotion
Dissertation Committee

Chair
Nicholas Salsman, Ph.D., ABPP
Assistant Professor of Psychology

Member
Robert T. Ammerman, Ph.D., ABPP
Professor of Pediatrics

Member
Kathleen Hart, Ph.D., ABPP
Professor of Psychology
Table of Contents

Table of Contents........................................................................................................... i
Acknowledgements ........................................................................................................... ii
List of Tables ................................................................................................................... iv
List of Figures ................................................................................................................... v
List of Appendices ........................................................................................................... vi

Chapter

I. Review of the Literature............................................................................................. 1
II. Rationale and Hypotheses...................................................................................... 31
III. Method...................................................................................................................... 35
IV. Proposed Analyses ............................................................................................... 44
References ..................................................................................................................... 47
Appendices ..................................................................................................................... 59
V. Dissertation .............................................................................................................. 65
References ..................................................................................................................... 91
Tables............................................................................................................................. 97
Figures ........................................................................................................................... 100
Appendices ..................................................................................................................... 101
Summary......................................................................................................................... 110
Acknowledgements

Many people have contributed to the completion of this project, all of whom I owe a debt of gratitude. Many thanks to my chair, Dr. Nicholas Salsman who provided valuable feedback and guidance throughout the process. I was also fortunate to have Dr. Kathleen Hart on my committee. Dr. Hart has not only been invaluable throughout the dissertation process, she has been a source of support and humor throughout my tenure at Xavier.

A dissertation is never a solo project and that is true of this project as well. Several members of the Ammerman research team were instrumental in collecting the data and scoring the measures. Many thanks to Lauren Schaller, Sarah Skaja, Katrina Dedona, Audrey Norris, and Evan Ammerman, all of whom devoted countless hours to assisting in the completion of this project. I want to also offer my thanks to Dr. Judith Van Ginkel the staff at Every Child Succeeds. Your dedication to the families we serve is extraordinary, and I feel blessed to have the opportunity to work such an extraordinary group of people.

There are several people without whom this project could not have been completed. First, let me offer my sincerest gratitude to Dr. Robert Ammerman. It has been my extraordinary good fortune to be mentored by Dr. Ammerman for the past six years, and I know that his guidance and support has contributed to my growth as both a therapist and a researcher. Thanks must also be extended to Dr. Jennie Noll and Dr. Chad Shenk for their valuable comments on various versions of this document. Thank you to Amy Bodley, who has been a consistent and valued source of support and empathy. I would also like to express my appreciation to my mother-in-law, Jane Teeters and my brother, Patrick Voegele, who have provided endless support and encouragement I want
to thank my children, Justine and Sam, who have endured countless days and nights of mom locking herself in her office to write.

Most of all, I want to thank my incredible husband, Matt. His support and love have sustained me throughout graduate school and the completion of this project. There is absolutely no way I could have done this without him – he is unquestionably the most amazing person I have ever known.

Finally, to all of the women in this study who invited us into their homes and their lives, sharing their stories with us, I offer my thanks and admiration. I continue to be reminded of your strength and resilience in the face of sometimes seemingly insurmountable obstacles. Working with each of you has motivated me to continue my work in this area and to contribute to the efforts of helping mothers meet their goals for themselves and their children.
List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter V</td>
<td></td>
</tr>
<tr>
<td>1. Demographic Characteristics of Study Participants By Maltreatment Group</td>
<td>100</td>
</tr>
<tr>
<td>2. IFEEL Pictures Data: Mean Number of Responses by Category</td>
<td>101</td>
</tr>
<tr>
<td>3. Correlations: BDI-II, CTQ, and IFEEL</td>
<td>102</td>
</tr>
</tbody>
</table>
# List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter V</td>
<td></td>
</tr>
<tr>
<td>1. Frequency distribution of CTQ score</td>
<td>103</td>
</tr>
<tr>
<td>Appendix</td>
<td>Page</td>
</tr>
<tr>
<td>---------------</td>
<td>------</td>
</tr>
<tr>
<td>Proposal</td>
<td></td>
</tr>
<tr>
<td>Appendix A</td>
<td>59</td>
</tr>
<tr>
<td>Appendix B</td>
<td>60</td>
</tr>
<tr>
<td>Dissertation</td>
<td></td>
</tr>
<tr>
<td>Appendix A</td>
<td>104</td>
</tr>
<tr>
<td>Appendix B</td>
<td>107</td>
</tr>
<tr>
<td>Appendix C</td>
<td>112</td>
</tr>
<tr>
<td>Appendix D</td>
<td>113</td>
</tr>
<tr>
<td>Appendix E</td>
<td>114</td>
</tr>
</tbody>
</table>
Chapter I

Review of the Literature

Early caregiving experiences can have lasting consequences on developmental trajectories. Experiencing maltreatment at the hands of one’s parent or caregiver is perhaps the most damaging interaction a child can suffer and certainly has implications for subsequent psychological, emotional, and cognitive functioning. Though debate exists regarding an operational definition of childhood maltreatment (Herrenkohl, 2005), the definition often includes both acts of commission, or child abuse, and acts of omission, or child neglect. Subsequently, childhood maltreatment may best be defined as any such acts perpetrated against a child by a parent or caregiver that causes harm, result in the potential for harm, or threat of harm (Leeb, Paulozi, Melanson, Simon, & Arias, 2008). Examples of child abuse include physical, sexual, emotional or psychological abuse while child neglect is frequently conceptualized as a failure to meet the physical or emotional needs of the child.

Trickett and McBride-Chang (1995) conducted a systematic review of the literature examining the impact of childhood maltreatment on multiple domains of functioning and found extensive evidence that such experiences lead to harmful consequences impacting multiple developmental domains. The authors’ review indicated that experiencing abuse in childhood is related to disrupted attachment, increases in externalizing and internalizing problem behaviors, greater peer rejection, poorer academic performance, and increased aggression in childhood. Sexual abuse has been implicated in displays of inappropriate sexual behaviors in childhood, earlier onset of sexual activity, and increases in suicidal and self-harm behaviors in adolescence. Though
not always the case, the effects of childhood maltreatment can remain into adulthood and manifest as externalizing and internalizing symptoms, increased risk for perpetrating violence, increased use of alcohol and drugs, and increased parenting problems (Trickett & McBride-Chang, 1995).

Experiences of childhood maltreatment represent a deviation from normative developmental experiences thought to underlie optimal child outcomes. Specifically, early interactions between the child and their significant caregiver are central to the development of skills necessary for successful adaptation to and navigation within the environment (Feldman, 2007). Such interactions are dependent on contributions from both child and caregiver, though the onus for much of this is on the caregiver, in many cases the mother. Early in the child’s life, an important aspect of mother-child interactions includes the development of synchrony or reciprocal exchanges between parent and child that include responding to and regulating emotional and behavioral responses. In order for this to be successful, each participant must be able to engage in simultaneous tasks including monitoring their own affect and behavior as well as accurately interpreting the affect and behavior of the other person. Subsequently, the child’s emotional development is partially contingent on the caregiver’s ability to appropriately and sensitively respond to their cues.

Given the importance of this interaction between parent and child, the ability to accurately decode and interpret the emotions of others is a requisite skill. Disruptions in the development of this can have significant consequences that extend beyond childhood and may impact parenting abilities. Previous research has demonstrated a link between experiences of childhood maltreatment and subsequent sensitivity to facial expressions
EFFECTS OF CHILDHOOD MALTREATMENT

(e.g., Masten et al., 2008)) as well as differences in processing facial expressions of emotion (e.g., Pollack, Cicchetti, Hornung, & Reed, 2000).

**Childhood Maltreatment and Effects on Emotional Development**

One model that has been proposed to account for the effects of childhood maltreatment on emotional development, specifically the ability to accurately identify facial expressions of emotion, is social information processing theory. Based in part on social learning theory, social information processing (SIP) posits that our responses to social stimuli are based on schemas we have developed in response to environmental influences (Crick & Dodge, 1994; Milner, 1993). SIP is thought to be comprised of four stages: (1) attending to and encoding information, (2) interpreting and evaluating information, (3) integrating of information and selecting of a response, and (4) implementing the response and monitoring outcome (Milner, 2003).

Social information processing models further propose that during the first two stages of processing, we rely on schema that we have developed based on our previous experiences (Crick & Dodge, 1994). Though these cognitive heuristics provide mental shortcuts that allow for rapid processing of social information, use of such schema may also contribute to mistakes in processing. For example, attention may be directed to only certain types of information to the exclusion of other, perhaps equally valuable information (Crick & Dodge; Milner, 1993).

While earlier conceptualizations of cognitive processing models similar to SIP focused largely on only cognitive processes, more recent formulations as described by Milner (1993) have emphasized the importance of considering emotions as an integral part of processing social information. During the first three steps of the SIP model,
emotions may serve multiple purposes. During the first step, in which we attend to and encode information, emotions may serve as internal cues that direct our attention to salient environmental cues. Once we have directed our attention, emotions may also influence our interpretation of information in the environment and may increase or decrease motivation to choose a particular response (Milner).

In applying this model to emotional processes, Lemerise and Arsenio (2000) hypothesize that emotions assist us in assigning value to social stimuli. That is, emotions provide information that may direct our attention to the most salient environmental cues. Encoding and interpreting emotional cues requires that individuals are able to encode their own emotions, the emotions of others, and other situational cues. Of particular importance is the ability to accurately encode the emotional cues of others as this provides valuable information that assists in determining how to respond most appropriately. Furthermore, encoding ability is influenced by both our mood and our level of arousal. Subsequently, the social information that is most salient is partially dependent on any one of these factors (Lemerise & Arsenio).

Experiences of maltreatment in childhood can potentially disrupt or impair emotional development, including recognition of facial expressions of emotion. Maltreated children, compared to their non-maltreated peers, more quickly identify negative emotions (Pollak, Messner, Kistler, & Cohn, 2009) but are less able to identify the antecedents for those emotions. Perlman, Kalish, and Pollak (2008) conducted a study comparing physically abused children to non-abused children matched on age and socioeconomic status with regards to their ability to accurately identify antecedent for emotions. Their findings indicate that physically abused, compared to their non-abused
peers, were less able to differentiate between antecedents that preceding anger and sadness. That is, they were as likely to endorse situations preceding sadness as also preceding anger. Furthermore, they were more likely to suggest that all types of situations elicit negative emotions (Perlman, Kalish, & Pollak). Other research has found that maltreated children display faster reaction times for particular emotions. Masten et al., (2008) compared maltreated children to non-maltreated children matched for age, gender, and IQ on cognitive processing ability in response to facial expressions of emotions. Subsequent findings indicate that maltreated children, compared to controls, displayed faster reactions times in response to fearful faces. These findings suggest that the emotional development of maltreated children, as indicated by their response to facial expressions of emotion, is disrupted in several fundamental ways. It is possible that maltreated children selectively attend to specific information in their environments which may be considered an adaptive response to a threatening environment. For example, if a child lives in a home with a physically abusive caregiver, becoming skilled at detecting anger cues from that caregiver serves as a self-protective mechanism. If the child is able to detect subtle cues of negative emotions, he or she is more likely to be able to avoid further harm.

Research examining the influence of childhood maltreatment experiences on ability to accurately interpret the facial expressions of others, research has indicated that outcomes may vary based on the type of maltreatment experienced. Pollak, Cicchetti, Hornung, & Reed (2000) compared non-maltreated children, physically neglected, and physically abused children in an attempt to further delineate this relationship. Non-maltreated children in this study were matched to those in the maltreatment groups on
age, socioeconomic status, race, sex, and receptive vocabulary ability and were recruited from the same geographical area as those in the maltreatment groups. Children were first presented with one of twenty-five stories depicting the main character experiencing an event that was likely to elicit happiness, sadness, disgust, fear, and anger. Following this, children were shown three photographs that included both the target emotion of the story and two unrelated emotions and asked to point to the emotion that best described how the character in the story was feeling. Results indicated differential relationships between groups and between different emotions. Overall, non-maltreated children were better at the emotion recognition task compared to both physically neglected and abused children. Neglected children displayed greater difficulty in recognizing anger compared to both non-maltreated and physically abused children, whereas physically abused children were less accurate in recognizing sadness compared to controls though no significant difference was found in comparison to their neglected peers. Pollak et al., also examined hit rates, or the probability that the child would choose the correct target emotion in response to the content of each vignette. For example, if the presented vignette consisted of a sad narrative, the correct response would be to select sad as the matching emotion. Neglected children displayed the most difficulty with the emotion discrimination task compared to physically abused and nonmaltreated children. In addition, neglected children tended to apply broader criteria for the selection of sadness compared to physically abused and nonmaltreated children indicating that such children were more likely to view protagonists in presented vignettes as being sad. Similarly, physically abused children, compared to neglected and nonmaltreated children, were more likely to view protagonists in presented vignettes as being angry.
Children who have been physically abused appear to display diverse responses to threatening emotions such as anger. In an experiment designed to examine the relationship between maltreatment experiences and attention bias to threat-related emotions, Pine et al. (2005) engaged physically abused and non-abused children in a dot probe task. Children were shown one of three pairs of photographs of adults. Each consisted of an adult displaying a neutral facial expression paired with one of the following: angry/threatening expression, happy expression, or neutral expression. One photograph from each pair was randomly presented on the left side of the screen and one on the right. Immediately following presentation of the pictures, a dot probe appeared for 1100 milliseconds on either the left or right side of the screen. Children were asked to press one of two buttons indicating the location of the dot. Mean reaction times were calculated and attention bias was determined by subtracting the mean reaction time on trials in which the dot appeared on the same side of the screen as the target emotion from mean reaction time on those trials in which the dot appeared on the side opposite the target emotion. Positive scores were thought to indicate a positive attention bias while negative scores were representative of negative attention bias or avoidance of the emotional stimuli (Pine et al.).

Pine and his colleagues (2005) found that children reporting the most severe physical abuse displayed greater avoidance of angry/threatening stimuli compared to both controls and children who experienced lesser degrees of physical abuse. This tendency to avoid angry/threatening faces was even more pronounced for those children who were both severely physically abused and displayed symptoms of posttraumatic stress disorder compared to nonabused children and abused children without PTSD. However, it should
be noted that the majority of children with severe physical abuse also displayed symptoms of PTSD which poses some difficulty in terms of interpreting these results. While it is clear that children who experienced severe physical abuse were more likely to avoid angry/threatening displays of emotion, it is not clear that this was a result of the abuse alone or a manifestation of PTSD symptoms. Regardless, these findings provide support for the contention that experiences of abuse may predispose children to attentional biases, specifically a bias towards avoidance of threatening or angry stimuli (Pine et al.)

Though avoidance of angry facial expressions is one potential outcome of physical abuse, other studies have revealed different responses to anger in similar children. Physically abused children have been found to detect anger earlier (Pollak, Messner, Kistler, & Cohn, 2009), identify anger with less information (Pollak & Sinha, 2002), and identify anger in response to ambiguous stimuli (Pollak, Cicchetti, Hornung, & Reed, 2000) compared to non-abused children. In a study designed to elucidate differences in perceptual preference for anger, Shackman and Pollak (2005) presented physically abused and non-abused children with pictures and vocalizations of their mothers depicting anger, sadness, and happiness. The children were also presented with pictures and vocalizations of unfamiliar adults depicting those same emotions. Following presentation of the stimuli, children were asked to indicate the emotion being expressed. Findings indicate that, in general, physically abused children displayed a preference for anger and identified anger more frequently when produced by their mothers. This finding did not extend to those children without a history of abuse (Shackman & Pollak).

Collectively, these findings suggest that not only is anger a particularly salient emotion
for physically maltreated children, but that this effect is intensified when anger is displayed by a significant caregiver.

A large proportion of the current literature has revealed that physically abused children appear to be particularly sensitive to facial expressions of anger. However, there is evidence to suggest that recognition of other negative emotions is also impacted. Physically abused and non-maltreated children were shown pictures of angry, happy, sad, and fearful faces that were presented as vague images that gradually gained greater definition (Pollak & Sinha, 2002). In response to these pictures, the children were asked to identify whether the emotion being displayed was anger, happiness, sadness, or fear in addition to providing a rating of their confidence in making that selection. While the physically abused children more accurately identified anger with less information compared to controls, they needed more information to identify sadness. Similarly, physically abused children, compared to their non-abused peers, displayed less accuracy in identifying sadness (Pollak, Cicchetti, Hornung, & Reed, 2000). In response to a task in which abused and non-abused children were shown pictures of faces that were morphed to range in intensity from 100 percent happy or fearful to neutral and asked to indicate whether the emotion was happy, fearful, or neutral, Masten et al. (2008) found that abused children displayed faster reactions times compared to controls for fearful faces suggesting that abused children display increased sensitivity to fearful stimuli.

Neglect, another frequent form of childhood maltreatment, exerts its own unique influence on emotional development. In a comparison of neglected and non-neglected children on various measures of emotional development, including emotional understanding and emotional regulation, neglected children were less able to understand
and interpret emotions compared to their non-neglected peers (Shipman, Zeman, Penza, & Champion, 2000). Furthermore, they were more likely to display deficits in emotion regulation and use less adaptive coping and regulation strategies. Sullivan, Bennett, Carpenter, & Lewis (2008) found that neglected children showed deficits compared to controls across three different emotional tasks: emotion labeling, recognition of emotional expressions, and matching emotional expressions to context. Interestingly, participants in this study were assessed at two time points, 12 months apart, with findings remaining consistent across time suggesting that deficits in emotion knowledge may persist over time. Children who have been neglected also display less accuracy in identifying anger (Pollak, Cicchetti, Hornung, & Reed, 2000).

Maltreated children not only struggle to accurately identify facial expressions of emotions in others but also struggle with identifying situations that are likely to result in various emotional responses. Perlman, Kalish, and Pollak (2008) compared maltreated 5 year-olds to a comparison group of non-maltreated children matched on age, sex, race, and family demographic variables to determine the effects of maltreatment on accuracy in identifying antecedents of emotions. Findings revealed that maltreated children, compared to their non-maltreated counterparts, displayed less accuracy when asked to identify the antecedents for anger and sadness. That is, maltreated children were less able to differentiate between those situations designed to elicit anger and sadness such that either emotion was considered equally probable. While maltreated children appear to be more adept at recognizing some facial expressions (i.e., anger or sadness), they appear to be less able to predict emotions that may follow a given situation.
Sexual abuse has been found to negatively impact emotional development. In a comparison of sexually abused and non-abused girls, participants who had been sexually abused tended to display lower emotional understanding of anger and sadness, were less able to regulate their emotions, more likely to inhibit anger (particularly in the presence of their fathers), and were less likely to report that their parents provided support for displays of anger or sadness (Shipman, Zeman, Penza, & Champion, 2000). Taken together, these findings support the contention that sexually abused children struggle to interpret the emotional states of others and thus may respond inappropriately.

**Childhood Maltreatment Experiences and Effects on Adult Emotional Ability**

A substantial body of literature has amassed documenting the effects of childhood maltreatment on developmental processes, including emotional development and sensitivity to emotional cues. However, the majority of this literature has focused on children and largely ignored the question of whether or not those effects observed in childhood extend into adulthood. Research that does exist documenting the effects of childhood maltreatment on adult functioning has largely focused on psychiatric diagnoses, drug and alcohol use, and other psychological variables (Trickett & McBride-Chang, 1995) with minimal focus on the lasting effects of childhood maltreatment on adult recognition of facial expressions of emotion.

To address this paucity in the literature, Gibb, Schofield, and Coles (2009) investigated the relationship between experiencing a history of childhood maltreatment and information processing biases in response to facial expressions of emotion. Undergraduates completed self-report measures indicating any experiences of childhood maltreatment in addition to current symptoms of depression and anxiety. To assess
attentional biases, participants engaged in a dot-probe task in which they were shown pairs of pictures; one in which an individual displayed a neutral facial expression and the other with a different emotion (i.e., angry, happy, or sad). After presentation of each pair, a dot appeared which replaced either the neutral picture or the target emotion and participants were asked to identify the location of the dot. Mean bias scores were calculated by subtracting response time on trials in which the dot appeared in the location of the target emotion from response time on trials in which the dot appeared in the location of the neutral face. Positive values indicated an attentional bias for target emotions while negative values indicated avoidance for target emotions. Results indicated that participants who endorsed experiencing childhood maltreatment displayed an attentional bias for angry faces compared to their non-maltreated peers (Gibb, Schofield, & Coles).

To examine whether a history of childhood maltreatment would also predict increased sensitivity to anger, participants in the same study were shown pictures of individuals displaying anger, sadness, or happiness that were altered to such that the images began with neutral expressions and morphed into the target emotion at varying levels of intensity, for example 20% angry or 10% neutral (Gibb, Schofield, & Coles, 2009). Following presentation of the pictures, participants were asked to identify the emotion being displayed. Participants with histories of self-reported childhood abuse endorsed anger in the 20% to 40% range at significantly higher rates than non-maltreated participants. This suggests that having a history of childhood maltreatment lends itself to greater sensitivity to detecting anger in adulthood, findings similar to those found in children (Pine et al., 2005; Pollak, Cicchetti, Hornung, & Reed, 2000; Shackman & Pollak, 2005). It is also important to note that both the attentional bias and sensitivity
displayed were specific to anger and no other emotions, a finding also similar to those found in studies examining this relationships in children. Findings from this investigation of maltreatment history and information processing biases provide support for the contention that such experiences in childhood have consequences that extend beyond childhood into adulthood.

The current state of research on the effects of childhood maltreatment on adult emotional functioning has a number of limitations. Most of the research has relied on self-reports of childhood maltreatment as opposed to verified cases. Another notable limitation is the use of undergraduate populations as opposed to a wider age range. While it is true that significant differences emerged between maltreated and non-maltreated participants, the generalizability of these findings to other populations is limited, particularly with regards to populations thought to be considered at higher risk for less optimal developmental outcomes including individuals with lower income, less education, and presence of psychopathology. Of particular interest in the proposed study is the relationship between maltreatment history and maternal sensitivity to infant facial expressions of emotion.

**Maltreatment History and Parenting Behaviors**

Adults with histories of childhood maltreatment are at greater risk of maltreating their own children. Often referred to as the intergenerational transmission of abuse and neglect, investigations of this relationship have consistently provided support for increased risk for child abuse in adults who were abused themselves as children (Dixon, Brown, & Hamilton-Giachritsis, 2005; Marcenko, Kemp, & Larson, 2000; Milner et al., 2010). Parents abused as children are more likely to become parents at a younger age,
have a history of mental illness or depression, and become involved with violent individuals, all of which are known to contribute to greater risk for abusing a child (Dixon, Browne, & Hamilton-Giachritis).

It must be stated that all parents with abuse histories do not go on to abuse their own children. Nonetheless, there is gathering evidence that supports the contention that these parents are at greater risk for developing maladaptive parenting behaviors (e.g., Alexander, Teti, & Anderson, 2000; Banyard, Williams, & Siegel, 2003; Jacobvitz, Leon, & Hazen, 2006). Research findings have yielded results indicating that mothers who experienced childhood maltreatment are more likely to engage in role reversal with their children (Alexander, Teti, & Anderson), endorse greater use of physical discipline (Banyard, Williams, & Siegel; Cohen, Hien, & Batchelder, 2008; Schuetze & Das Eiden, 2005), report lower parenting satisfaction, and increases in neglectful parenting (Banyard, Williams, & Siegel).

In general, parents at greater risk (i.e., parents with maltreatment histories, depression, significant stress) for maltreating their children may display deficits in terms of their ability to engage with their children in a developmentally appropriate manner. Combined findings from several studies indicate that at-risk mothers are more likely to engage in intrusive interactions with their infants (Cerezo, Pons-Salvador, & Trenado, 2008), less likely to feel as though they can efficaciously respond to their child’s distress (Leerkes & Crockenberg, 2006), and display limited ability to understand the reasons for their children’s emotional displays (Shipman & Zeman, 2001).

Consistent with findings regarding the impaired relational skills of at-risk parents, multiple studies have documented the relationship between childhood maltreatment
history and the quality of interactions between maltreated mothers and their children. In a review of the literature examining the effects of childhood sexual abuse on later maternal behaviors, a reliable finding that has emerged indicates that mothers with these types of abuse experiences are less involved with their infants and tend to display restricted affect in mother-child interactions (DiLillo & Damakek, 2003).

Mothers with histories of interpersonal trauma who also present with symptoms of posttraumatic stress disorder may be most susceptible to engaging in maladaptive interactions with their children. Schechter et al. (2008) found that mothers who experienced both interpersonal violence and displayed more severe symptoms of PTSD were more likely to engage in interactions with their children that were marked by decreased physical and psychological distance compared to mothers with similar histories and fewer symptoms of PTSD. Similarly, the mothers with more severe PTSD symptoms were more likely to provide distorted mental representations (i.e., overly positive or negative, unrealistic expectations) of their child’s behavior which was significantly related to frightening, intrusive, or hostile maternal behavior (Schechter et al.).

Direct effects of childhood maltreatment history and increased risk for abusing one’s own children have been observed. However, other inquiries have attempted to delineate the relationship further by proposing that the presence of other variables may either mediate or moderate the relationship. Using a large sample that included U.S. Naval recruits and undergraduate students, Milner et al. (2010) proposed a model in which trauma symptoms would mediate the relationship between childhood maltreatment history and child abuse potential. Participants were assessed regarding childhood experiences of physical and sexual abuse and witnessing interpersonal violence, child
abuse potential, types of disciplinary tactics used by participants’ parents, and current trauma symptoms. Results indicate that for both groups, a history of childhood abuse was related to increased trauma symptoms and risk of engaging in child physical abuse as an adult. Support for consideration of trauma symptoms as a mediator between experiencing childhood maltreatment and risk for perpetrating child physical abuse were mixed. For both naval recruits and undergraduates, the addition of trauma symptoms to the model increased the amount of explained variance, however after controlling for trauma symptoms; the relationship between childhood maltreatment history and risk for child physical abuse remained statistically significant indicating that requirements for full mediation were not met. Regardless, these results provide further support for the negative impact of experiencing maltreatment (Milner et al.). Other research has proposed that childhood maltreatment indirectly impacts risk for child abuse through its effects on other aspects of adult functioning such as substance abuse (Marcenko, Kemp, & Larson, 2000) and development of psychiatric disorders (Dixon, Browne, & Hamilton-Giachritsis, 2005).

In an attempt to explicate the mechanisms underlying maladaptive parenting behaviors, Hildyard and Wolfe (2007) propose that parents who have neglected their children may manifest cognitive processing errors similar to those found in maltreated children. Using a sample of mothers who perpetrated substantiated cases of child neglect and demographically similar, non-maltreating mothers, the authors assessed maternal sensitivity to infant emotions. Of note is the high percentage of mothers in the neglectful group (70.6%) compared to those in the non-neglectful group (39.4%) who endorsed having experienced childhood maltreatment. Though not directly tested in this study, the
difference between the groups on childhood maltreatment history was statistically significant and warrants further consideration. Mothers were shown pictures of one-year-old infants displaying different facial expressions of emotion and asked to identify the emotion they perceived as being depicted. Responses were then compared to those from a normative sample, compared between neglectful and non-neglectful mothers, and examined for bimodal response patterns. Subsequent results indicate that neglectful mothers, compared to non-neglectful mothers displayed numerous differences in their responses to infant emotional expressions. Neglectful mothers were more likely to indicate that the infants were displaying shame and less likely to indicate feelings of interest. In addition, neglectful mothers provided more atypical responses than non-neglectful mothers, that is, more responses that were significantly different from the normative sample. Finally, neglectful mothers produced significantly more bi-modal response patterns compared to non-neglectful mothers (Hildyard & Wolfe).

Overall, these findings (Hildyard & Wolfe, 2007) lend weight to the argument that neglectful parenting is qualitatively different from what may be considered more adaptive parenting as evidenced by the absence of neglectful parent behaviors. Clearly the authors did not directly test the relationship between maltreatment history and neglectful parenting. Regardless, it is notable that such a large percentage of neglectful parents endorsed their own history of childhood maltreatment.

Unfortunately, research on the continued influence of childhood maltreatment on emotion recognition abilities is scant. However, it is reasonable to propose that if such effects persist into adulthood, mothers with maltreatment histories might also continue to display similar deficits. As such, further research is required to understand the extent to
which such processing deficits persist into adulthood and how compromised ability to accurately read the emotional expressions of others may impact parenting, and subsequently child development.

**Attachment, Maternal Sensitivity to Infant Emotions and Child Development**

A fundamental task for all human infants is the development of a caring and protective relationship with a significant caregiver. John Bowlby first proposed attachment theory, a biologically predisposed behavioral system in which infants engage in instinctual behavior that draws particular responses from a primary caregiver thereby securing the infant’s safety and security (Bowlby, 1969). Attachment theory has evolved over time to provide theoretical support for the mechanisms that underlie typical psychological and emotional development. Just as it allows for greater understanding of those relationships and behaviors that support optimal development, attachment theory also provides a lens through which atypical development can be understood (Bretherton, 1992).

Underlying attachment theory is the premise that infants who experience a relationship with a primary caregiver who consistently and sensitively responds to their needs are more likely to achieve favorable developmental outcomes (Bretherton, 1997; Main, 1996). Bowlby proposed that based on these interactions with caregivers, children develop internal working models of self and others which serve as templates for the child’s future relationships. Consequently, the early interactions between the child and their caregiver have tremendous long-term implications. Children who are fortunate enough to have a caregiver who meets both their physical and emotional needs are more likely to develop internal working models that suggest that they are worthy of care and
that others can be trusted. Unfortunately, other children experience interactions with caregivers that may be inconsistent, chaotic, neglectful, or even abusive. These children are more likely to develop internal working models that reinforce the belief that the world is not a safe place and that they cannot trust that their needs will be met (Bretherton).

While Bowlby was the original voice of attachment theory, one of his long-time collaborators, Mary Ainsworth, conducted extensive research that ultimately led to the first attachment classification system (Main, 1996). Her lab procedure, known as the Strange Situation, provides a structured observational assessment of child responses to separation from and reunion with a primary caregiver. Following years of recording the behaviors of children participating in the Strange Situation, Ainsworth arrived at the following attachment classifications: secure, avoidant, and resistant. Secure infants were those who displayed signs of distress when separated from their parents but readily greeted their parents upon their return and were able to be comforted. Avoidant infants did not cry after their caregiver’s departure and avoided or ignored them upon their return while resistant infants appeared to display anger towards their caregiver and alternated between seeking contact with the caregiver and resisting them. Later, a fourth category was added, disorganized or disoriented attachment. In response to the Strange Situation, these children would display behavior that included freezing in the presence of their parent while others would cry at the parent’s departure but then ignore them upon their return (Main).

Attachment classification in early childhood has been identified as a significant predictor of subsequent developmental outcomes. An ongoing longitudinal study of 180 parents and their children recruited in the late 1970’s has provided valuable data to
support this contention (Erickson, Sroufe, & Egeland, 1985). Now well into its third decade, a number of notable findings have emerged that are consistent with the premise that early experiences, particularly those within the context of the parent-child relationship, continue to wield significant influence. In the aforementioned study, children’s attachment patterns were assessed at 12 and 18 months of age and later used for comparison with data that continues to be collected from study participants. Though discussion of the findings in their entirety is beyond the scope of this document, provision of a few examples will serve to provide support for the importance of parental behaviors. For example, infants categorized as avoidant were more likely to display overly dependent behaviors in both preschool and middle school. Disorganized attachment significantly predicted both self-injurious behavior in young adulthood (Yates, 2005) and the presence of symptoms consistent with borderline personality disorder (Carlson, Egeland, & Sroufe, 2009). Now parents themselves, researchers have continued to follow those children first assessed nearly 30 years ago and have found evidence supporting the existence of cross-generational influences on parenting (Kovan, Chung, & Sroufe, 2010). In a comparison of direct observations of parenting behaviors in both first and second generation parents that were subsequently coded on 4 variables (Overall Parenting, Supportive Presence, Quality of Assistance, and Hostility), researchers found a moderate correlation (.43) between parenting quality in both first and second behavioral observations. This relationship held even after controlling for parent IQ, socioeconomic status, and reported levels of life stress suggesting a unique contribution of exposure to early models of parenting behavior (Kovan, Chung, & Sroufe).
It is true that attachment is an interaction between both parent and child. Nonetheless, sensitive caregiving is thought to be the primary determinant of attachment behaviors, providing further emphasis on the importance of being able to accurately perceive and decipher infant behavior. In consideration of the research that has documented better outcomes for children who are securely attached compared to those who are insecurely attached, examination of those components of parental behavior that promote secure attachment is crucial.

In a review of research that has examined those components that appear to best account for maternal sensitivity and synchrony, both thought to underlie the development of attachment in infants, Feldman (2007) proposed that one critical aspect of these interactions is timing. Those infants whose mothers time their responses to their baby’s cues such that they respond both sensitively and quickly but also allow some time to lapse in order for the baby to process the interaction, are more likely to develop adaptive emotion regulation and social skills. During the first few months of life, infants do not possess the ability to self-regulate and so rely on caregivers to provide this for them. In essence, the primary caregiver serves as an external source of regulation until the infant is able to do this for themselves (Feldman).

Another crucial feature of synchrony is the mother’s ability to “read” her infant. Mothers who are able to accurately interpret their baby’s facial expressions and vocalizations are more likely to match their responses to those of the child (Feldman, 2007). For example, if a baby is smiling at his mother one would anticipate that her natural response would be to return his smile. Consequently, the infant is provided with a mirror that both allows for affirmation of his own internal state and evidence that he has
elicited the intended response in another. When a mismatch occurs (e.g., the child’s mother responds with a frown), this may be experienced by the infant as confusing and may also serve to prevent the child from learning to predict future events. In addition to providing mirroring to the child, affective communication between mother and child provides a source of information that assists the child in modifying their behavior. Similar to adults, infants engage in goal-directed behavior (Tronick, 1989). Caregiver responses to the infant’s affective communication allow the infant to evaluate whether their intended behavior resulted in success or failure (Gianino & Tronick, 1988).

Synchrony or affective attunement as it is sometimes referred to (Feldman, 2007), has been implicated in the development of attachment. Researchers interested in further examining this relationship recorded mother-child interactions at 4, 8, and 12 months and coded them for both maternal and infant affect expression (Pauli-Pott & Mertesacker, 2009). At 18 months of age, the mother-child dyads participated in the Strange Situation to determine child attachment category. Results indicated that at the four month observations, infants who displayed high levels of negative affect and were responded to with high levels of maternal positive affect were more likely to be categorized as insecurely attached at 18 months compared to mother-infant dyads in which affect was more accurately matched. Interestingly, 12 month observations revealed that infants whose mothers responded with negative affect to their displays of positive affect and infants whose mothers responded with positive affect to their displays of neutral affect were more likely to categorized as insecurely attached compared to those mother-infant dyads in which affect was accurately matched (Pauli-Pott & Mertesacker). These findings provide support for the argument that caregiver ability to accurately interpret and match
their infant’s affective displays is a critical component of the infant’s successful adaptation to their environment.

While these results indicate that the development of secure attachment is predicated, in part, on matching the affective state of the infant, discussion of the mechanisms underlying this ability in caregivers is notably lacking. One possible explanation for affective mismatches between caregiver and child is a deficit on the part of the caregiver to accurately read the baby’s emotional cues. Consequently, research that attempts to identify variables that contribute to deficits in caregiver sensitivity is warranted. A primary goal of the proposed study is to examine the impact of childhood maltreatment history on maternal sensitivity to infant affective cues.

**Depression and Effects on Sensitivity to Facial Expressions of Emotion**

Depression can wield powerful effects on an individual’s ability to attend to and process the social behavior of others. Previous research has clearly demonstrated this relationship such that depressed individuals have been found to display deficits in recognizing facial expressions of emotion (i.e., Feinberg, Rifkin, Schaffer, & Walker, 1986; Mandal & Bhattacharaya, 1985; Zuroff & Colussy, 1986). However, inquiry in this area has frequently yielded mixed findings with some studies reporting that depressed individuals display attentional biases (Mandal & Bhattacharaya) while others report decreased recognition accuracy (Feinberg, Rifkin, Schaffer, & Walker: Zuroff & Colussy). The constructs of attentional bias and inaccurate encoding of emotional information are discrete entities. While an attentional bias suggests that an individual differentially allocates their attentional resources towards a particular type of stimuli, inaccurate encoding suggests that individuals see emotions that others simply do not see.
Regardless, the presence of either attentional biases or inaccurate encoding poses potential difficulties for individuals who are depressed such that they may miss vital social information. To further examine this relationship, Persad and Polivy (1993) compared depressed female college students, non-depressed female college students, depressed female psychiatric inpatients, and non-depressed female psychiatric inpatients on an emotion recognition task. Depression was measured using the Beck Depression Inventory. Participants were shown 14 pictures depicting the following emotions: fear, anger, surprise, contempt or disgust, happiness, sadness, and indifference. Following examination of the pictures, participants were then asked to complete the following tasks: (1) Name the emotion they thought was being portrayed (2) Endorse one of five types of behavioral responses in response to the expression (i.e., avoidance, approach, tolerance, freezing, desire to help person) (3) Provide their emotional reaction to the picture, and (4) Rate their degree of comfort with their reaction (Persad & Polivy).

Results support the contention that depression contributed to more errors in emotion recognition and that these errors appeared to be global as opposed to applicable to specific emotions. Furthermore, being depressed was significantly related to greater endorsement of fear in response to facial expressions of emotion, less comfort with emotional reactions to expressions of anger, disgust, indifference, and surprise, and higher ratings of subjective depression in response to emotional expressions (Persad & Polivy, 1993). Taken together, these findings lend weight to the argument that depression disrupts both recognition and response to the emotions displayed by others. Subsequently, these deficits may serve to decrease the individuals’ perceived sense of social efficacy in their interactions with others. Based on research that has demonstrated a
relationship between depression and emotion recognition abilities, one could surmise that maternal depression might exert a similar influence regarding a mother’s ability to accurately perceive her child’s emotional signals.

**Depression and Effects on Parenting**

Maternal depression, both prenatal and postnatal, has long been recognized as a concerning clinical issue. Historically, this specific manifestation of depression was often thought of as a ‘rite of passage’ of sorts, frequently referred to as the ‘baby blues’ and subsequently dismissed as something the new mother would eventually overcome (Najman, Andersen, Bor, O’Callaghan, & Williams, 2000). More recently, however, a growing body of literature has begun to develop suggesting that maternal depression is not simply a benign occurrence, but instead can have deleterious effects for children of mothers who experience significant depression (Campbell, Cohn, & Meyers, 1995; Halligan, Murray, Martins, & Cooper, 2007; Maughan, Cicchetti, Toth, & Rogosch, 2007).

Rates of depression among pregnant and post-partum women have been reported at approximately 13% (Evans, Heron, Francomb, Oke, & Golding, 2001). Special populations may, in fact, have higher rates of maternal depression, including mothers with lower socioeconomic status (Kurz, 2005; Kurz & Hesselbrock, 2006; Segre, O’Hara, Arndt, & Stuart, 2007). Mora et al. (2009) examined rates of depression in a high-risk sample of over 1,700 women beginning in the prenatal period through two years postnatal and found that 29% of these women displayed clinically elevated symptoms of depression. Sociodemographically at-risk mothers may be more vulnerable to developing symptoms of depression as the result of having relatively fewer resources at their
disposal. Segre et al., examined the role of three indices of social status (income, education, and occupational prestige) in a sample of 4,332 postpartum women and found that income and occupational prestige were significant predictors of postpartum depression. Specifically, lower income, lower occupational prestige, young maternal age, being single, and having more children were all significant predictors of the presence of symptoms of depression. Overall, income was the strongest predictor, even after controlling for other sociodemographic variables. As income decreased, symptoms of depression increased such that only 7.5% of those women with income greater than $70,000 reported clinically significant depression compared to 20% of women reporting income less than $10,000 (Segre et al.).

Findings regarding the effects of maternal depression have been consistent in that most studies have demonstrated negative impacts on child developmental outcomes. In a review of studies conducted in both developing and developed countries, Stewart (2007) found that the presence of maternal depression during pregnancy and the postnatal period were significant predictors of poor infant growth in developing countries like India and Pakistan. Other research has found that maternal depression is associated with numerous parenting variables. Using a sample of mothers from an Early Head Start program, Coyle, Roggman, and Newland (2002) found that maternal depression was related to more negative mother-child interactions, greater frequency of spanking, more insecure attachment, and reports of decreased maternal satisfaction with mother-child interactions. Furthermore, Coyle et al., using path analysis found a direct relationship between maternal depression and child attachment security.
Children of depressed mothers are at greater risk for the development of psychopathology and have been found to have less developed emotional regulation strategies, greater socio-emotional difficulties (Maughan, Cicchetti, Toth, & Rogosch, 2007) and more insecure attachment patterns (Teti, Gelfand, Messinger, & Isabella, 1995) compared to children of non-depressed mothers. In a 13-year longitudinal study, Halligan et al. (2007) found that children of mothers with postnatal depression were more likely to develop anxiety disorders in adolescence.

Effects of maternal depression on child functioning extend beyond the realm of affective and socio-emotional functioning to other areas including cognitive and language development. Sohr-Preston and Scaramella (2006), in a review of the recent literature, found that children of mothers who were depressed in the prenatal and postnatal periods were more likely to have later cognitive and language difficulties. However, these findings were most significant for children whose mothers were chronically depressed as opposed to having experienced one discrete episode of depression.

In a study that examined the effects of maternal depression from the prenatal period through the child reaching 16 years of age, Hay et al. (2008) found that exposure to maternal depression during the postpartum period was a significant predictor of cognitive ability at 11 years of age as measured by IQ testing. In general, children whose mothers did not experience postpartum depression received higher IQ scores compared to children of depressed mothers. Differences in cognitive abilities between children of depressed and non-depressed mothers were more pronounced for boys compared to girls. Boys of depressed mothers scored, on average, 20 points lower on a measure of cognitive ability, compared to boys of non-depressed mothers. Girls of depressed mothers scored,
on average, three points lower on the same measure of cognitive ability, compared to girls of non-depressed mothers (Hay et al.).

Clearly, there are multiple consequences of maternal depression. However, those that impinge upon the mother-child relationship are particularly troublesome and may underlie many of the subsequent difficulties that many of these children encounter. Though the role of maternal depression in the development of negative outcomes for children has been well-documented in the literature, what has been less understood is a model for understanding how maternal depression may impact child functioning. Goodman and Gotlib (1999) have proposed a developmental model for conceptualizing the role of maternal depression in influencing child outcomes. Their model posits four mechanisms of transmission: heritability of depression, innate dysfunctional neuroregulatory mechanisms, exposure to negative maternal cognitions, behaviors, and affect, and finally, the stressful context of the children’s lives. It is this third mechanism, exposure to negative maternal cognitions, behaviors, and affect that perhaps poses the greatest risk in undermining early mother-child interactions which are critical for optimal child development. Previous research has yielded findings indicating that depressed mothers, compared to non-depressed mothers, display more negative views of themselves as parents (Gelfand & Teti, 1990), engage in more negative interactions with others (Gotlib, 1982), and display greater affective expressions of sadness and irritability in interactions with their children (Cohn, Campbell, Matias, & Hopkins, 1989).

Using social information processing (SIP) as a model for conceptualizing the relationship between the impact of maternal depression and mother-child interactions, the role of maternal cognitions, behaviors, and affect becomes clear. The SIP model proposes
that processing of social information relies, in part, on pre-existing schema that have
developed in response to environmental factors. As previously discussed, research
findings have supported the contention that depressed mothers are more likely to display
negative schema as evidenced by a greater propensity towards engaging in negative
cognitions with regards to their parenting ability. In addition, research findings have
indicated that depression significantly contributes to greater facial expression recognition
errors (e.g. Persad & Polivy, 1993). Taken together, these findings suggest that depressed
mothers are less likely to engage with their children in ways that contribute to positive
mother-child interactions. A critical element of such interactions is the mother’s ability to
accurately identify and interpret her child’s social cues, including facial expressions of
emotion, in order to engage in the most appropriate response. Depressed mothers may be
at a disadvantage when interacting with their children given the impact that depression
imparts on both sensitivity to social cues (e.g., Persad & Polivy) as well as interpreting
social cues using pre-existing schema and those cognitions typically associated with
depression (e.g. Gelfand & Teti, 1990).

Taken together, the findings regarding the influence of depression on sensitivity
to social cues and parenting, it would seem critical to further examine this relationship as
it pertains to parenting behaviors. To date, minimal attention has been directed towards
delineating the relationship between maternal depression and sensitivity to infant facial
expressions of emotion. Zahn-Waxler and Wagner (1993) compared depressed mothers
to a group of demographically similar depressed mothers on sensitivity to facial
expressions of emotion. Participants were shown pictures of one-year old infants and
asked to provide one word that they felt best described the emotion being displayed.
Results indicate that depressed mothers were more likely to see fear and anxiety compared to non-depressed mothers. Furthermore, within the depressed group, mothers with more severe symptoms were more likely to see fear compared to less severely depressed mothers (Zahn-Waxler & Wagner). Though these findings provide evidence for the impact of depression on maternal sensitivity to infant cues, there are several limitations that must be considered. Mothers in the depressed group included both depressed mothers and those classified as having bipolar depression, suggesting that subsequent findings may be difficult to generalize to mothers displaying only symptoms of unipolar depression. Furthermore, participants were largely middle class, limiting the generalizability of findings for other populations. In fact, results of this study yielded a significant effect of socioeconomic status such that higher socioeconomic status was associated with more fear and interest responses in both groups and fewer sad responses (Zahn-Waxler & Wagner). Further research examining the influence of depression on this dimension of parenting in mothers with fewer socioeconomic advantages is critical to providing increasing our understanding of the potential impact of depression.
Rationale and Hypotheses

The importance of early caregiving experiences cannot be understated. Early relationships have the potential to shape developmental trajectories. When those early relationships are marred by experiences of maltreatment, deleterious consequences may follow. An area of development that may be impacted by experiences of abuse and neglect is the ability to both decode and interpret emotional content, a skill that is essential for optimal psychosocial functioning (e.g., Lemerise & Arsenio, 2000). Specifically, the ability to accurately decode and interpret the emotions of others facilitates communication, social interactions, and perception of nonverbal cues (e.g., Pollak, Cicchetti, Hornung, & Reed, 2000).

Previous research has demonstrated a link between childhood experiences of physical abuse and greater sensitivity to and processing of facial displays of anger (Pollak & Kistler, 2001; Pollak, Cicchetti, Hornung, & Reed, 2000). Other studies have found that neglected children show global deficits in emotional abilities including emotional labeling, emotional expression recognition and matching emotional expressions to context (Shipman, Schneider, Fitzgerald, Sims, Swisher, & Edwards, 2007; Sullivan, Bennet, Carpenter, & Lewis, 2008). Having experienced sexual abuse also appears to have an effect on emotional development such that girls with sexual abuse histories display lower emotional understanding compared to their nonmaltreated peers (Shipman, Zeman, Penza, & Champion, 2000).

While the majority of research on the effects of maltreatment on ability to process facial displays of emotion has been focused on children, Gibb, Schofield, and Coles
(2009) found that young adults with histories of childhood maltreatment were more likely to display increased sensitivity to facial expressions of anger suggesting an information processing bias towards anger. While it would seem important to further explore the long-term effects of childhood maltreatment on adult sensitivity to facial expressions of emotion, there is minimal research that has addressed this question. Of particular interest is maternal sensitivity to infant facial expressions of emotion and specifically exploring the effects of childhood maltreatment on this ability.

In addition, maternal depression has the potential to exert deleterious effects on maternal behaviors and the early caregiving relationship. Depressed individuals, compared to their non-depressed counterparts, have been found to display less sensitivity to facial expressions of emotion (Persad and Polivy, 1993). Maternal depression, in particular, has been identified as a contributor to problematic mother-child interactions. Previous research has yielded findings indicating that maternal depression is associated with negative mother-child interactions, greater frequency of spanking (Coyl, Roggman, & Newland, 2002), and is associated with problematic attributions regarding child behavior (Bolton et al., 2003). A growing literature investigating the impact of maternal depression indicates that depressed mothers, compared to non-depressed mothers tend to display decreased sensitivity to infant cues (Field, 2002), struggle to engage with their children (Radke-Yarrow et al., 1993) and engage in more negative interactions (Palaez et al., 2008). Individuals with childhood maltreatment histories have been identified as being at greater risk for developing depressive disorders in adulthood (Chapman et al., 2004). Given this relationship, it is possible that maternal sensitivity to infant cues is impacted by both childhood maltreatment history and maternal depression.
This study will build on the literature that suggests that childhood experiences of abuse exert an influence on one's ability to perceive and interpret facial expressions of emotion. However, this study will extend the literature by examining this relationship in first-time mothers. This is a critical question to examine given the importance of positive early mother-child interactions which are partially dependent on the mother's ability to read her infant’s cues. In addition, there is a dearth of research examining the potential role of depression in mediating the relationship between maternal childhood maltreatment history and sensitivity to infant facial expressions of emotion. The proposed study will attempt to delineate this relationship further and contribute to the growing body of literature examining maternal depression and mechanisms through which such experiences impact parenting behaviors.

Ho1: Mothers with moderate to severe experiences of childhood maltreatment (as measured by the Childhood Trauma Questionnaire; CTQ) will display less sensitivity to infant facial expressions of emotion (as measured by the IFEEL Pictures) compared to mothers with minimal or no experiences of childhood maltreatment.

Ho2: Mothers with moderate to severe experiences of childhood maltreatment (as measured by the Childhood Trauma Questionnaire; CTQ) will provide more atypical responses to infant facial expressions of emotion (as measured by the IFEEL Pictures) compared to mothers with minimal or no experiences of childhood maltreatment.

Ho3: Mothers displaying greater symptoms of depression (as measured by the Beck Depression Inventory-Second Edition; BDI-II), will display bimodal profiles in response to infant facial expressions of emotion (as measured by the IFEEL Pictures) compared to mothers displaying fewer symptoms of depression.
Ho4: The relationship between maternal experiences of childhood maltreatment (as measured by the CTQ) and sensitivity to infant facial expressions of emotion (as measured by the IFEEL pictures) will be mediated by the presence of symptoms of depression (as measured by the Beck Depression Inventory-Second Edition; BDI-II). Using Baron and Kenny’s (1986) recommendations for testing mediational models, the following are proposed. A visual representation of this model can be found in Figure A.

1. Maternal childhood maltreatment history will be negatively related to sensitivity to infant facial expressions of emotion (as tested in Ho1).

2. Maternal childhood maltreatment history will be positively related to current maternal symptoms of depression.

3. Current maternal symptoms of depression will be negatively related to sensitivity to infant facial expressions of emotion.

4. The negative relationship between maternal childhood maltreatment history and sensitivity to infant facial expressions of emotion will be mediated by current maternal symptoms of depression. After statistically controlling for maternal symptoms of depression, maternal childhood maltreatment history will no longer be significantly negatively related to sensitivity to infant facial expressions of emotion.
Chapter III

Method

The current study will analyze data that has been collected as part of a larger longitudinal study of program retention in a child abuse prevention program. This study will utilize a portion of the data collected to examine the relationship between maternal history of childhood maltreatment and parenting behaviors.

Participants

Participants will be all first-time mothers enrolled in a parent study (described below) which examines Every Child Succeeds (ECS), a local child abuse prevention program that provides home visitation for at-risk, first-time mothers and their babies. There are 103 participants who completed all the measures between 2008 and 2010 and will therefore be included in the sample for the proposed study. To qualify for participation in ECS, mothers must have at least one of the following demographic characteristics that reflect risk for poor parenting outcomes: late (after 12 weeks gestation) or inadequate prenatal care, young maternal age (18 or younger), unmarried, or low income (as indicated by receipt of government assistance). Recent ECS statistics indicate that approximately 25.8% of mothers participating in ECS received late or inadequate prenatal care, 29.7% are 18 years of age or younger, 89.0% are unmarried, and 86.6% have low income (ECS, 2008).

Power Analysis

A power analysis was conducted using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), a general power analysis program, to determine the minimum number of
participants required to complete proposed statistical analyses appropriately in order to obtain effect sizes similar to those found in previous research. Hildyard and Wolfe (2007) examined the relationship between neglectful parenting and sensitivity to facial expressions of emotion and found a total effect size of .36 ($f^2$) and effects sizes for each emotion category ranging from .07 to .68 ($\eta^2$). In a similar study, Frances and Wolfe (2008) compared abusive and non-abusive fathers on their responses to the IFEEL pictures and found a total effect size of .67 ($f^2$) and effect sizes for emotion categories ranging from .05 to .85 ($\eta^2$). These effect sizes are considered to be large effect sizes. Subsequently, this proposed study will need to include at least 60 participants in order to achieve a power of .80 to detect an effect size of .50 ($f^2$), which is a large effect, using an alpha level of .05.

**Measures**

**Infant Facial Expressions of Emotion from Looking at Pictures (IFEEL Pictures)**

The IFEEL pictures (Emde, Osofsky, & Butterfield, 1993) measure parental responsiveness to infant displays of emotions (see sample pictures in Appendix A). Thus, the IFEEL pictures are designed to examine the construct of sensitivity of the care-giving environment. The IFEEL consists of 30 color photographs depicting infants displaying various emotional states (e.g., sadness, joy, surprise). Administration consists of sequentially presenting photographs to respondents and providing them with the following standardized instructions: “Tell us in one word, if possible, the strongest and clearest feeling that each baby is expressing.” For each picture, respondents write those words they feel best describes the baby’s emotional state. Using a validated lexicon
developed by the authors, responses are later coded based on twelve emotional categories (i.e., Surprise, Interest, Joy, Content, Passive, Sad, Caution/Shy, Shame/Guilt, Disgust/Dislike, Anger, Distress, and Fear) (see sample response and profile sheets in Appendix B). Any response that does not fit into the twelve existing categories is coded as “Other” (Applebaum, Butterfield, & Culp, 1993).

For the purposes of examining the effects of childhood maltreatment status on maternal sensitivity to infant expressions of emotion, participant responses can be examined in three ways. Participant responses to the IFEEL pictures can be compared to the normative reference sample to determine if they are providing atypical responses. The authors provide the frequency distribution for the normative reference sample’s responses to each of the pictures. For example if a participant labels a particular picture as “sad” but the normative sample labeled the same picture as “interest” 95% of the time and provided no “sad” responses, this would be considered an atypical response. Another possible examination of responses to the IFEEL pictures is to compare groups on each of the emotion categories to determine if one group sees more or less of a particular emotion category compared to the other group. Finally, the total number of participant responses in each emotion category can be summed and plotted on a profile sheet provided in the IFEEL scoring manual. This form provides means and standard deviations of the normative reference sample for each of the emotion categories. By plotting responses on this form it is possible to determine if a participant has provided an unusual response pattern such as a bimodal profile. A bimodal response pattern is one in which a participant’s profile includes one emotion category that is three standard deviations above the mean and another emotion category of opposite hedonic tone that is at least two or
more standard deviations above the mean. For example, a participant may produce a profile in which their sad responses are three standard deviations above the mean in addition to happy responses that are also three standard deviations above the mean (Applebaum, Butterfield, & Culp, 1993). Previous research has yielded findings indicating that depressed mothers tend to display a bimodal response pattern in response to the IFEEL pictures suggesting that such mothers display an over-reliance on two emotion categories (Zahn-Waxler & Wagner, 1993).

For the purposes of this study, each of the previously described methods for examining responses to the IFEEL pictures will be used. However, in examining atypical responses, atypicality will be defined as a dichotomous variable. Participants who provide responses in an emotion category that are atypical will be classified as atypical yielding 13 separate atypicality scores for each participant.

Reliability for the IFEEL pictures was established using test-retest methodology with administrations occurring six weeks apart. Reliability coefficients ranged from .31 to .91 indicating good reliability for most emotion categories with the exception of the following emotions: passive, shame, and disgust, which had lower test-retest reliability. Longer term stability was assessed at three, six, and thirteen months and indicated that responses tend to remain stable over time (Emde, Osofsky, & Butterfield, 1993). In order to establish evidence of the validity of the IFEEL pictures, 58 female undergraduate students were shown the IFEEL pictures and asked to rate them on an 8-point scale regarding how well each emotion category captured that picture resulting in 12 ratings for each picture. Results indicated that participant rankings were consistent with existing emotion categories (Applebaum, Butterfield, & Culp, 1993; Ridgeway, 1993).
Previous research using participants’ total number of responses in each of the 13 categories of the IFEEL has been utilized to assess caregiver sensitivity in high risk samples including adolescent mothers, mothers at-risk for maltreating their children and depressed mothers (Butterfield, 1993; Osofsky & Culp, 1993; Zahn-Waxler & Wagner, 1993). The IFEEL has successfully demonstrated differences between high-risk and lower-risk samples in terms of sensitivity to infant cues.

**Childhood Trauma Questionnaire: Brief Version (CTQ)**

The CTQ, (Bernstein & Fink, 1996) is a widely used retrospective measure of maternal experiences of childhood abuse and neglect (See Appendix C). It is comprised of 28 items that are rated on a 5-point Likert scale and yields scores for five clinical scales: Physical Abuse, which assesses respondent experiences of being hit with an object or sustaining visible injuries or marks resulting from being hit by a family member; Physical Neglect, which provides a measure of the extent to which the respondent perceives that their physical needs were adequately met (i.e., medical care, food, and clothing); Emotional Abuse, which captures the respondents’ perception that family members called them derogatory names or made hurtful comments to them; Emotional Neglect, which assesses the extent to which the respondent feels as though they were loved and accepted by their family; and Sexual Abuse which summarizes the respondents experiences of being molested or forced to engage in sexual acts. Responses on the CTQ are summed for each subscale yielding possible score of 5, indicating no abuse or neglect experiences to 25, indicating severe to extreme experiences of abuse and neglect. Cut-off scores can also be obtained for each of the subscales scores resulting in classification of abuse and neglect experiences into the following categories: none, low, moderate, and
severe. However, Bernstein and Fink state that cut scores employed may be determined based on the purpose of CTQ data collected. Examiners who want to minimize instances of false-positive cases may choose to implement the middle cut score (i.e., moderate to severe). Previous research has used this approach to place participants into maltreated versus non-maltreated groups (Ammerman & Nance, 2008; Rikhye et al., 2008; Carpenter et al., 2007). For the purposes of the proposed study, participants’ scores will be examined in two ways. To examine the first hypothesis, participants will be placed into one of two groups: participants receiving scores in the none or low range will be assigned to the “None to Low” maltreatment group while participants receiving scores in the moderate to severe range will be placed in the “Moderate to Severe” maltreatment group. Analysis of the fourth hypothesis, which proposes a mediational model, will utilize participants’ total scores on the CTQ.

In addition to providing five clinical scales, the CTQ also includes a Minimization/Denial scale. This scale, yielding possible scores of zero to three, provides a measure of validity regarding the responses provided by the participant. A score of one or higher on this scale suggests that respondents may be attempting to provide socially desirable responses. Utilizing a college sample, Bernstein and Fink (1996) found that the majority of respondents (75%) received a score of zero on the Minimization/Denial indicating that providing socially desirable responses is relatively uncommon. Of the remaining respondents, 10.9% received a score of 1, 10.9% received a score of 2, and 3.25% received a score of 3 on this scale. In the proposed study, participant scores on the Minimization/Denial scale will be examined to determine the extent to which higher scores are related to the independent variables.
The CTQ has yielded both excellent reliability and validity. Internal consistency coefficients range from .63 (Physical Neglect) to .93 (Sexual Abuse). Test-retest reliability was determined based on an administration interval of two to six months and yielded mean stability coefficients of .80 indicating that the CTQ has good consistency (Bernstein et al., 1994). Evidence of validity of the CTQ was determined, in part, through exploratory factor analysis of the original 70-item version and yielded four factors with adult respondents (Bernstein et al., 1994) and five factors with adolescent respondents (Bernstein, Ahluvalia, Pogge, & Handelsman, 1997). Criterion related validity was established using an adolescent sample in which therapist trauma ratings were compared to responses on the CTQ. Results indicated that respondent CTQ score were highly correlated with therapist trauma ratings (Bernstein et al., 2003).

**Beck Depression Inventory-II (BDI-II)**

The Beck Depression Inventory-II (BDI-II) is a widely used self-report measure of depressive symptomatology (see Appendix D) (Beck, Steer, & Brown, 1996). Respondents endorse each of the BDI-II’s 21 items on a 4-point scale, (0 = not present to 3 = severe) to assess the severity of depressive symptoms over the past two weeks. Items on the BDI-II are designed to capture symptoms of depression as specified by the Diagnostic and Statistical Manual, Fourth Edition (DSM-IV). Item responses are summed with subsequent total scores ranging from 0 to 63. BDI-II total scores provide an indication of the depression severity with scores higher than 13 indicating the presence of clinically elevated symptoms of depression. In the proposed study, the BDI-II total score will be used to quantify current symptoms of maternal depression.
Reliability of the BDI-II was established using both clinical and non-clinical samples. Internal consistency coefficients ranged from .39 to .70 for clinical respondents and .27 to .74 for non-clinical respondents. Test-retest reliability was examined using a small clinical sample and 1 one week interval between test administrations yielding excellent reliability ($r = .93$). Convergent and discriminant validity of the BDI-II was also examined. Comparison of the BDI-II to the Revised Hamilton Psychiatric Rating (HRSD-R) resulted in a correlation coefficient of .71 indicating that the BDI-II has good convergent validity. Discriminant validity was determined through comparison of the BDI-II to the Revised Hamilton Anxiety Rating Scale, yielding a correlation coefficient of .47 suggesting that each measure is tapping into two discrete constructs.

**Demographic Information**

Research personnel completed the Demographics Form (see Appendix E) with each participant during the baseline study visit. This form was created by the investigative team to assess participant age, race, ethnicity, gender, marital and education status, income, legal involvement, and receipt of services (e.g., Medicaid, food stamps, etc.). Information obtained the demographics form to be used in this study will include participant date of birth, race and ethnicity, marital status, highest level of educational attainment, current employment status, and household yearly income.

Demographic data will be examined in several ways in the proposed study. First, means and standard deviations will be calculated to provide a statistical description of study participants. Next, means and standard deviations will be used to determine if there are significant differences between maltreatment groups. Finally, means and standard deviations derived from the demographic data will be examined to determine the
presence of significant relationships with both maternal responses to the IFEEL pictures and maternal depression symptoms.

Procedure

The proposed study is an archival study that will include participants from the parent study, which has received approval from the Institutional Review Board (IRB) at Cincinnati Children's Hospital Medical Center (CCHMC). Participants in the parent study were recruited from ECS. Home visitors or family assessment workers presented mothers who were newly enrolled in ECS with information about the study during their first home visit and contacted study personnel with contact information for those mothers who were interested in participating in the study. Study personnel contacted interested mothers and provided further detail about study participation. Those mothers who continued to express interest in participation were scheduled for a baseline study visit. During this first study visit, study personnel completed informed consent procedures with potential participants. Mothers still interested in participating in the study, signed the consent document and the first study visit was completed including administration of the measures included in the proposed archival study. Mothers received $25.00 for completion of this study visit. All archival data that will be used for the proposed study will be de-identified such that participants will be identified by number only and will be stored in a password protected database. Approval to complete the proposed study will be sought from Xavier University’s Institutional Review Board.
Chapter IV
Proposed Analyses

Descriptive statistics will be calculated for all study variables and presented in a table. Examination of the first hypothesis proposing that mothers with histories of childhood maltreatment will be less sensitive to infant facial expressions of emotion compared to non-maltreated mothers will be addressed using a one-way multivariate analysis of variance (MANOVA). This analytic approach will allow for a comparison of maltreated and non-maltreated mothers on sensitivity to infant facial expressions of emotion. Participants’ CTQ total scores will serve as the independent variable while each of the 13 emotion categories assessed with the IFEEL pictures will serve as dependent variables. Use of this analytic approach allows for examination of the influence of the independent variable on multiple dependent variables while reducing the risk of Type I errors that may result from conducting multiple analysis of variance analyses.

Hypothesis two, which proposes that mothers with moderate to severe experiences of childhood maltreatment will display more atypical responses compared to mothers with low or no experiences of maltreatment, will be examined using a univariate analysis of variance.

Hypothesis three proposes that mothers with greater symptoms of depression will provide more bimodal response patterns in response to infant facial expressions of emotion compared to those mothers with fewer symptoms of depression. Chi-square analyses will be used to examine this relationship.
Hypothesis four posits a mediational model such that the relationship between maternal childhood maltreatment status and sensitivity to infant facial expressions of emotion will be mediated by maternal symptoms of depression. In exploring this model, only those emotions found to be significantly related to maternal maltreatment history, as tested in the first hypothesis, will be used in required analyses. Correlations examining the relationship between maternal maltreatment history, as measured by participants' total scores on the CTQ, and responses to the IFEEL pictures and BDI-II scores will be calculated and displayed in a correlation table. Results of these correlational analyses will determine if meditational analyses continue to be warranted. Assuming that significant relationships are found between maternal maltreatment history and maternal sensitivity to infant cues and symptoms of maternal depression, the method recommended by Baron and Kenny (1986) and Holmbeck (1997) will be employed. Based on this method, variables hypothesized to mediate the relationship between two other variables must meet the following four requirements: (1) the predictor or independent variable must demonstrate a significant relationship with the proposed mediator variables, (2) the predictor or independent variable must demonstrate a significant relationship with the dependent variable, (3) the proposed mediator variable must demonstrate a significant relationship with the dependent variable, and (4) after statistically controlling for the proposed mediating variable, the relationship between the predictor or independent variable and dependent variable becomes non-significant. To test this mediational model, the following series of four multiple regression analyses will be conducted.
1. The first regression analysis will examine the relationship between maternal childhood maltreatment history and sensitivity to infant facial expressions of emotion.

2. The second regression analysis will examine the relationship between maternal childhood maltreatment history and current symptoms of depression.

3. The third regression analysis will examine the relationship between current symptoms of depression and sensitivity to infant facial expressions of emotion.

4. The fourth regression analysis will examine the relationship between maternal childhood maltreatment history and maternal sensitivity to infant facial expressions of emotion after controlling for current symptoms of depression.
References


interactions of depressed and nondepressed mothers and their children. *Journal of
Abnormal Child Psychology, 21*, 683-695.

Ridgeway, D. (1993). The meaning of infant emotional expressions in the IFEEL
pictures: Validation studies. In: R.N. Emde, J.D. Osofsky, & P.M. Butterfield (Eds.), *The IFEEL pictures: A new instrument for interpreting emotions* (pp. 131-

parental bonding, and gender effects: Impact on quality of life. *Child Abuse &
Neglect, 32*, 19-34. doi: 10.1016/j.chiabu.2007.04012

Schechter, D. S., Coates, S. W., Kaminer, T., Coots, T., Zeanah, C. H., Davies, M.,
Schonfeld, I. S., Marshall, R. D., Liebowitz, M. R., Trabka, K. A., McCaw, J. E.,
and Myers, M. M. (2008). Distorted maternal mental representations and atypical
behavior in a clinical sample of violence-exposed mothers and their toddlers.
*Journal of Trauma and Dissociation, 9*, 123-147.
doi:10.1080/15299730802045666

childhood and parenting outcomes: Modeling direct and indirect pathways. *Child

postpartum depression: The relative significant of three social status indices.
*Social Psychiatry & Psychiatric Epidemiology, doi:10.1007/s00127-007-0168-1*


Appendix A

The IFEEL Pictures, lexicon, and coding sheets are protected by copyright so they are not reproduced in this document. The IFEEL pictures can be ordered by contacting, Karen Fehringer, Ph.D. at the Graduate School of Public Health, University of Colorado

The Beck Depression Inventory, Second Edition (BDI-II) is copyright protected so it is not reproduced in this document. The measure is available through Pearson Assessments, Inc. at www.pearsonassessments.com

The Childhood Trauma Questionnaire (CTQ) is protected by copyright so it is not reproduced in this document. The measure is available through Pearson Assessments, Inc. at www.pearsonassessments.com.
First Years Project
Demographics Form: Baseline

STUDY INFORMATION

Visit Date:_______ Study ID:____ ECS Number:__________

Condition:_____________ Agency:_____________________

Home Visitor:_____________ RA:______________________

MOTHER’S INFORMATION

1. Mother’s DOB: _____/_____/_______

2. Mother’s SS Number: ______-____-______

3. Mother’s Race (check one)
4. Mother’s Ethnicity:
   □ Caucasian
   □ African American
   □ Native American
   □ Asian/Pacific Islander
   □ Other
   □ Bi-Racial

   □ Appalachian
   □ Hispanic
   □ None

5. Marital Status:
   □ Married
   □ Single, never married
   □ Widowed
   □ Divorced
   □ Separated
6. Years of Education Completed: ____________

7. Highest Diploma Earned:  
   Enrollment:  
   - None 
   - High School Diploma 
   - GED 
   - Associate Degree 
   - Bachelor Degree 
   - Masters Degree 

8. Current School Enrollment:  
   - Yes 
   - No 

9. Most Recent Type of Employment: ____________

10. Current Work Status:  
    - No 
    - No, FOB working 
    - Yes, leave of absence 
    - Yes, part-time (1 - 20 hours) 
    - Yes, full-time (greater than 20 hours) 

---

**HOUSSELD INFORMATION**

11. Living Arrangements of Mother and Baby (check all that apply)  
    - Alone 
    - With father of baby 
    - With FOB’s parents 
    - With relative (s) 
    - Other 
    - With MOB’s s parents 
    - With other’s parents 
    - With other partner 
    - With friend (s) 

12. Household Composition (check all that apply)  
    - Father of baby 
    - Baby’s stepfather 
    - Baby’s sisters (include step or half) 
    - Baby’s brothers (include half or step) 
    - Other relative 
    - Friend (s) 
    - Paternal grandmother 
    - Paternal grandfather 
    - Mother’s boyfriend 
    - Maternal grandmother 
    - Maternal grandfather 

13. Total Number of People Who Live in Household: _______
14. Which of the following categories best describes your total household income for the past year? Include all sources of income from all people in your home.

- $3000 or less
- $3001 - $6000
- $6001 - $9000
- $9001 - $12000
- $12001 - $15000
- $15001 - $20000
- $20001 - $30000
- $30001 - $40000
- Over $40000
- Unknown

PREGNANCY/BABY INFORMATION

15. Are you pregnant now?
- No
- Yes

16. Baby’s name: ____________________________
   ____________________________
   ____________________________
   Last MI First

17. Baby’s DOB: ______/______/___________

18. Due Date if still pregnant: ______/______/___________


20. Baby’s Gender:  □ Female  □ Male

21. Baby’s Race:
   □ Caucasian  □ African American
   □ Native American  □ Asian/Pacific Islander
   □ Bi-Racial  □ Other

22. Baby’s Ethnicity:
   □ Appalachian  □ Hispanic  □ None
OTHER INFORMATION

23. Have you received any of the following services or assistance in the past year (check all that apply)?

Currently  |  Past 6 months  
---|---
- | - Substance abuse treatment
- | - Mental health or counseling
- | - Physician (for mother)
- | - Pediatrician (for baby)
- | - Dentist (for baby)
- | - Breastfeeding consultant
- | - Self-help or support group
- | - Housing assistance
- | - Early intervention (for baby)
- | - Emergency assistance
- | - Childcare
- | - Literacy
- | - Education
- | - MRDD services
- | - Other________________

Currently  |  Past 6 months  
---|---
- | - Job training
- | - Battered women's shelter
- | - Legal service
- | - K-TAP/AFDC/TANF
- | - Medicaid
- | - CHIP, KCHIP
- | - Unemployment
- | - Food stamps
- | - Energy assistance
- | - Social Security
- | - Supplemental Security Income, SSI
- | - WIC
- | - Specialty Clinic
- | - Disability evaluation

24. Where do you get most medical care for yourself?
- Primary care physician (private)
- Clinic
- Other
- No medical care
- Emergency room

25. When was the last time you got medical care for yourself? _____ / _____

26. Have you had involvement with any of the following in the past 6 months? (If there has been any involvement with CPS or law enforcement, please provide more specific details in the space provided below.)
- CPS (child protective services)
- Law enforcement
- None
27. Mother's Hobbies and Interests:

28. Family Information:
Chapter V:
Dissertation

Abstract

The present study examined the relationship between maternal experiences of childhood maltreatment, current depressive symptoms, and sensitivity to infant facial expressions of emotion in a sample of 103 first-time, at-risk mothers participating in a local home visitation program. Participants were placed into either “None to Low” or “Moderate to Severe” childhood maltreatment groups. A MANCOVA yielded no differences between maltreatment groups regarding sensitivity to infant facial expressions. An ANOVA was conducted to examine differences between maltreatment groups regarding the tendency to provide atypical responses to the IFEEL pictures and yielded no significant results. A t-test was conducted to determine if participants displaying a bimodal response pattern to the IFEEL pictures were more likely to report greater depressive symptoms than those participants with fewer depressive symptoms and yielded no significant results. Finally, a mediational model in which maternal depressive symptoms mediated the relationship between maternal childhood maltreatment history and maternal sensitivity to infant facial expressions of emotion was tested and yielded no significant results. Exploratory analyses revealed some significant relationships between different types of abuse (i.e., emotional abuse, sexual abuse, and physical abuse, emotional neglect and physical neglect) and responses to the IFEEL pictures. Participants with moderate to severe experiences of emotional neglect or physical abuse in childhood provided more fear responses compared to those with none to low experiences. Future research might focus on discrete types of abuse and their influence on parenting behaviors.
Effects of Childhood Maltreatment on Maternal Sensitivity to Infant Facial Expressions of Emotion

Facial expressions provide critical information that assist in guiding our interactions with and responses to others. Optimal social-emotional development is predicated, in part, on our ability to accurately interpret the emotions of others, including those communicated through facial expressions (Erickson & Schulkin, 2003; Marsh, Adams, & Kleck, 2005). Deficits in accurately recognizing facial expressions of emotion are linked to poor psychosocial outcomes, including difficulties in relationships with peers (Goodfellow & Nowicki, 2010).

Childhood maltreatment has been found to exert a profound influence on the capacity to accurately interpret facial expressions of emotion (Gibb, Schofield, & Coles, 2009; Masten et al., 2008; Pine et al., 2005; Pollak, Cicchetti, Horning, & Reed, 2000; Pollak & Sinha, 2002). One model that proposed to account for the effects of childhood maltreatment on the ability to accurately identify facial expressions of emotion is social information processing theory (SIP). SIP posits that we develop schemas in response to prior environmental influences and severe events such as childhood maltreatment. These schemas inform our responses to social stimuli (Crick & Dodge, 1994; Milner, 1993). SIP is comprised of four stages: (1) attending to and encoding information, (2) interpreting and evaluating information, (3) integrating information and selecting of a response, and (4) implementing the response and monitoring outcome (Milner, 2003). More recent SIP formulations have emphasized the importance of considering emotions as an integral part of processing social information. Lemery and Arsenio (2000) hypothesize that emotions assist us in assigning value to social stimuli. That is, emotions provide information that
may direct our attention to the most salient environmental cues. For example, the ability to accurately read the facial expressions of others allows us to respond sensitively, such as when a friend is angry or sad. Encoding and interpreting emotional cues requires that individuals are able to encode their own emotions, the emotions of others, and situational cues.

**Childhood Maltreatment and Recognition of Facial Expressions of Emotion**

Child maltreatment disrupts emotional development, including recognition of facial expressions of emotion. A growing body of research indicates that experiencing maltreatment in childhood leads to the development of SIP biases or inaccuracies regarding interpreting facial expressions of emotion (e.g., Pine et al., 2005; Pollak, Cicchetti, Horning, & Reed, 2000; Pollak, Messner, Kistler, & Cohn, 2009). Maltreated children, compared to their non-maltreated peers, have been shown to more quickly identify negative emotions (Pollak, Messner, Kistler, & Cohn, 2009), display faster reaction times to fearful faces (Masten et al., 2008), and display greater avoidance of angry faces (Pine et al., 2005). Development of greater sensitivity to negative affective displays may serve an adaptive function in childhood. For example, increased sensitivity to facial expressions of anger might serve as a protective function such that the child could become aware of possible signs of danger early enough to avoid or escape harm. In addition, childhood maltreatment is associated with decreased ability to recognize sadness (Pollak, Cicchetti, Hornung, & Reed, 2000),

There appears to be a differential effect of type of maltreatment with regards to interpreting facial expressions of emotion. Physically abused children, compared to non-abused children, display greater avoidance of angry or threatening stimuli (Pine et al,
2005), detect anger earlier (Pollak, Messner, Kistler, & Cohn, 2009), identify anger with less information (Pollak & Sinha, 2002), and identify anger in response to ambiguous stimuli (Pollak, Cicchetti, Hornung, & Reed, 2000). Neglected children, compared to their non-neglected counterparts, are less able to understand and interpret emotions (Shipman, Zeman, Penza, & Champion, 2000) and display difficulty with emotion labeling, recognition of emotional expressions, and matching emotional expressions to context (Sullivan, Bennett, Carpenter, & Lewis, 2008). Furthermore, neglected children identify anger with less accuracy compared to their non-neglected peers (Pollak Cicchetti, Hornung, & Reed, 2000). Sexual abuse negatively impacts emotional development such that sexually abused girls display lower emotional understanding of anger and sadness and less ability to regulate their emotions compared to their non-abused peers (Shipman, Zeman, Penza, & Champion, 2000).

Effects of Childhood Maltreatment on Adult Recognition of Facial Expressions of Emotion

Research to date has focused on the short-term effects of maltreatment and children’s emotional development, with limited focus on the possible lasting consequences of childhood maltreatment. As a result, the ability to accurately interpret the facial expressions of others in adulthood after having experienced maltreatment in childhood is less understood. Because childhood maltreatment has been associated with the development of SIP biases in children, it is possible that these effects extend into adulthood. Consequently, research that attempts to understand the continued impact of childhood maltreatment on adult emotional functioning, specifically the ability to interpret facial expressions of emotion, is warranted. Perhaps even more important are
questions examining whether mothers' experiences of maltreatment in their own
care of childhoods later impact adult mothers' sensitivity to their own infants' facial expressions.

Findings of a recent study suggest the possibility that childhood maltreatment continues to exert influence on individuals' recognition of facial expressions of emotion when they reach adulthood. In a study examining the role of childhood maltreatment on young adults' ability to accurately interpret facial expressions of emotion, college students completed a dot-probe task in which they were shown pairs of pictures; one in which an individual displayed a neutral facial expression and the other with an emotion (i.e., angry, happy, or sad). After presentation of each pair, a dot appeared that replaced either the neutral picture or the target emotion and participants were asked to identify the location of the dot. Mean bias score were calculated by subtracting response time on trials in which the dot appeared in the location of the neutral face. Positive values indicated an attentional bias; negative values indicated an avoidance for target emotions. Results indicate that participants experiencing childhood maltreatment displayed an attentional bias for angry faces compared to their non-maltreated peers (Gibb, Schofield, & Coles, 2009).

Participants in the same study (Gibb, Schofield, & Coles, 2009) were shown pictures of individuals displaying anger, sadness, or happiness that were altered such that the images began with neutral expressions and morphed into the target emotion at varying levels of intensity. Following presentation of the pictures, participants were asked to identify the emotion being displayed. Compared to non-maltreated participants, those who reported a history of childhood maltreatment identified facial expressions of anger at lower levels of intensity suggesting a greater sensitivity to detecting anger. These
findings are consistent with research examining this relationship in children which has demonstrated that maltreated children, compared to their non-maltreated peers display greater sensitivity to anger (Pollak, Cicchetti, Hornung, & Reed, 2000; Pollak, Messner, Kistler, & Cohn, 2009).

**Depression and Effects on Sensitivity to Facial Expressions of Emotion**

Depression can wield significant effects on an individual’s ability to attend to and process the social behaviors of others. Previous research has found that depressed individuals, compared to their non-depressed counterparts, display more recognition errors when asked to identify facial expressions of emotion (Feinberg, Rifkin, Schaffer, & Walker, 1986; Persad & Polivy, 1993; Surguladze et al., 2004) and are more likely to label neutral facial expressions as sad (Gollan, Pane, McCloskey, & Coccaro, 2008; Mandal & Bhattacharya, 1985).

The presence of attentional biases or emotion recognition errors poses potential difficulties for individuals who are depressed, including mothers. Depressed mothers may miss critical social information provided by their infants, including facial expressions of emotion. Stein et al. (2010) asked non-depressed mothers, depressed mothers, and mothers with generalized anxiety disorder (GAD), to look at pictures of 50 infant faces. Participants assigned ratings ranging from very negative to very positive for each of the pictures. Compared to mothers in both the non-depressed and GAD group, depressed mothers provided more negative ratings to negative infant faces. Other research has found that depressed mothers, compared to non-depressed mothers, make more recognition errors in response to happy infant faces (Arteche et al., 2011). These findings suggest that depressed mothers are more likely to display biases towards the negative
affect of their infants while demonstrating less ability to accurately interpret their infant’s positive affect.

**Importance of Maternal Ability to Read Infant Facial Expressions of Emotion**

It is widely accepted that early interactions between mother and child are central to the emotional development of the child (Feldman, 2007). Successful interactions between mother and child involve reciprocal exchanges that include responding to, labeling, and regulating the child’s emotional and behavioral responses (Krause, Mendelson, & Lynch, 2003; Sullivan, Carmody, & Lewis, 2010). A requisite skill for engaging in sensitive interactions and fostering the emotional development of her infant is the mother’s ability to accurately interpret her baby’s emotional cues, including facial expressions of emotion (Rosenblum, Dayton, & Muzik, 2009). Mothers who are able to accurately interpret their baby’s facial expressions and vocalizations are more likely to meet the emotional needs of the child (Feldman, 2007).

The current study was designed to extend the literature suggesting that childhood experiences of abuse exert an influence on ability to perceive and interpret facial expressions of emotion. However, this study will extend the literature by examining this relationship in mothers. In addition, there is a dearth of research examining the potential role of depression in mediating the relationship between maternal childhood maltreatment history and sensitivity to infant facial expressions of emotion. The proposed study will attempt to delineate this relationship further and contribute to the growing body of literature examining maternal depression and mechanisms through which such experiences impact parenting behaviors.
The purpose of the current study was to examine the relationship between maternal history of childhood maltreatment and its effects on maternal ability to interpret facial expressions of emotions in infants. Specifically, it was hypothesized that mothers with moderate to severe childhood maltreatment experiences would be less sensitive to infant facial expressions of emotion compared to mothers reporting none to low experiences of childhood maltreatment. It was also hypothesized that mothers with moderate to severe childhood maltreatment experiences would provide more atypical emotional responses to infant facial expressions of emotion compared to mothers with minimal or no experiences of childhood maltreatment. Depression and its effects on maternal sensitivity were also examined. It was hypothesized that mothers reporting greater symptoms of depression would also provide more bimodal response profiles to infant facial expression of emotion compared to those mothers reporting fewer depressive symptoms. Finally, this study examined depression as a mediator of the relationship between maternal childhood maltreatment history and sensitivity to infant facial expressions of emotion.

Method

Participants

Participants in this study (n = 103) were a subset of mothers enrolled in Every Child Succeeds (ECS) and also participating in the parent study of this project (n = 231). Mothers participating in ECS are recruited from a number of community sources including birth hospitals, social service agencies, and community clinics. ECS is a home visitation program for first-time mothers and their infants meeting criteria for at least one sociodemographic risk factor (e.g. low income, young maternal age) that places them at-
risk for poor parenting outcomes. One of the measures used in the current study (the IFEEL picture task) was introduced after two years of enrolling participants in the parent study. Consequently, 45% of the total sample completed all of the measures used in the current study and were included in the current sample. Mothers ranged in age from 16 to 42 years of age ($M = 21.25, SD = 4.32$). The sample was largely Caucasian (80.6%) but also included both African American (13.6%) and biracial (5.8%) participants. The majority of the data for this study was collected from mothers who had not yet given birth (81.6%) while the remaining mothers were enrolled after the birth of their baby (18.4%). Of the 103 participants, 54 were placed in the none to low maltreatment group while 49 were placed in the moderate to severe maltreatment group based on responses to the Childhood Trauma Questionnaire. Demographic characteristics of maltreated versus non-maltreated mothers are presented in Table 1. To qualify for participation in ECS, mothers must have at least one of the following demographic characteristics that reflect risk for poor parenting outcomes: late (after 12 weeks gestation) or inadequate prenatal care, young maternal age (18 or younger), unmarried, or low income (as indicated by receipt of government assistance). Among participants comprising the current sample, 32% received late or inadequate prenatal care, 17% were 18 years of age or younger, 86.4% were unmarried, and 95% reported having low income.

**Measures**

**Infant Facial Expressions of Emotion from Looking at Pictures (IFEEL Pictures).** The IFEEL pictures (Emde, Osofsky, & Butterfield, 1993; see Appendix A) measure parental responsiveness to infant displays of emotions. Thus, the IFEEL pictures are designed to examine the construct of sensitivity of the care-giving environment. The
IFEEL consists of 30 color photographs depicting infants displaying various emotional states (e.g., sadness, joy, surprise). Administration consists of sequentially presenting photographs to respondents and providing them with the following standardized instructions: “Tell us in one word, if possible, the strongest and clearest feeling that each baby is expressing.” For each picture, respondents write those words they feel best describes the baby’s emotional state. Using a validated lexicon developed by the authors, responses are later coded based on twelve emotional categories (i.e., Surprise, Interest, Joy, Content, Passive, Sad, Caution/Shy, Shame/Guilt, Disgust/Dislike, Anger, Distress, and Fear). Any response that does not fit into the twelve existing categories is coded as “Other” (Applebaum, Butterfield, & Culp, 1993)

For the purposes of examining the effects of childhood maltreatment status on maternal sensitivity to infant expressions of emotion, participant responses can be examined in three ways. Participant responses to the IFEEL pictures can be compared to the normative reference sample to determine if they are providing atypical responses. The authors provide the frequency distribution for the normative reference sample’s responses to each of the pictures. Participants’ total scores for each emotion category can be plotted on a template provided in the manual. This template summarizes mean scores and standard deviations of each of the 13 emotion categories for the normative reference sample. In plotting participant score on this template, any score that falls either two standard deviations above or below the mean for the reference sample would be considered atypical for that participant. For example, the mean number of responses provided by the reference sample in the “Sad” emotion category was 3.8 (SD = 2.2). If a participant provided nine responses in the “Sad” emotion category, this would be
considered an atypical response pattern as this is at least two standard deviations above the mean. Another possible examination of responses to the IFEEL pictures is to compare groups on each of the emotion categories to determine if one group sees more or less of a particular emotion category compared to the other group. Finally, the total number of participant responses in each emotion category can be summed and plotted on a profile sheet provided in the IFEEL scoring manual. This form provides means and standard deviations of the normative reference sample for each of the emotion categories. By plotting responses on this form it is possible to determine if a participant has provided an unusual response pattern such as a bimodal profile. A bimodal response pattern is one in which a participant’s profile includes one emotion category that is three standard deviations above the mean and another emotion category of opposite hedonic tone that is at least two or more standard deviations above the mean. For example, a participant may produce a profile in which their sad responses are three standard deviations above the mean and happy responses that are also three standard deviations above the mean (Applebaum, Butterfield, & Culp, 1993). Previous research has yielded findings indicating that depressed mothers tend to display a bimodal response pattern in response to the IFEEL pictures suggesting that such mothers display an over-reliance on two emotion categories (Zahn-Waxler & Wagner, 1993).

For the purposes of this study, each of the previously described methods for examining responses to the IFEEL pictures was used. However, in examining atypical responses, atypicality was defined as a dichotomous variable. Participants who provided responses in at least one emotion category that were atypical were classified as atypical.
Reliability for the IFEEL pictures was established using test-retest methodology with administrations occurring six weeks apart. Reliability coefficients ranged from .31 to .91 for the 13 emotion categories indicating good reliability for most emotion categories with the exception of the following emotions: passive, shame, and disgust, which had lower test-retest reliability. Longer term stability was assessed at three, six, and thirteen months and indicated that responses tend to remain stable over time (Emde, Osofsky, & Butterfield, 1993). In order to establish evidence of the validity of the IFEEL pictures, 58 female undergraduate students were shown the IFEEL pictures and asked to rate them on an 8-point scale regarding how well each of the 12 emotion categories were represented. Results indicated that participant rankings were consistent with existing emotion categories (Applebaum, Butterfield, & Culp, 1993; Ridgeway, 1993).

The IFEEL has successfully demonstrated differences between high-risk and lower-risk samples in terms of sensitivity to infant cues. Specifically, previous studies have utilized the IFEEL pictures to assess maternal sensitivity to infant facial expressions of emotion in high risk samples such as adolescent mothers and depressed mothers (Butterfield, 1993; Osofsky & Culp, 1993; Zahn-Waxler & Wagner, 1993).

**Childhood Trauma Questionnaire: Brief Version (CTQ).** The CTQ, (Bernstein & Fink, 1996) is a widely used retrospective measure of maternal experiences of childhood abuse and neglect (See Appendix C). It is comprised of 28 items that are rated on a 5-point Likert scale and yields scores for five clinical scales: Physical Abuse, which assesses respondent experiences of being hit with an object or sustaining visible injuries or marks resulting from being hit by a family member; Physical Neglect, which provides a measure of the extent to which the respondent perceives that their physical needs were
adequately met (i.e., medical care, food, and clothing); Emotional Abuse, which captures the respondents' perception that family members called them derogatory names or made hurtful comments to them; Emotional Neglect, which assesses the extent to which the respondents feel as though they were loved and accepted by their family; and Sexual Abuse which summarizes the respondents' experiences of being molested or forced to engage in sexual acts. Responses on the CTQ are summed for each subscale yielding a possible score ranging from 5, indicating no abuse or neglect experiences to 25, indicating severe to extreme experiences of abuse and neglect. Cut-off scores can also be obtained for each of the subscales scores resulting in classification of abuse and neglect experiences into the following categories: none, low, moderate, and severe. However, Bernstein and Fink state that cut scores employed may be determined based on the purpose of CTQ data collected. Examiners who want to minimize instances of false-positive cases may choose to implement the middle cut score (i.e., moderate to severe). Previous research has used this approach to place participants into maltreated versus non-maltreated groups (Ammerman & Nance, 2008; Carpenter et al., 2007 Rikhye et al., 2008.). For the purposes of the current study, participants' scores were examined in three ways. To examine differences between maltreated and non-maltreated groups, based on recommendations from Bernstein and Fink, participants were placed into one of two groups: participants receiving scores in the none or low range were assigned to the "None to Low" group while participants receiving scores in the moderate to severe range were placed in the "Moderate to Severe" group (See Figure 1 for distribution of participant CTQ scores). This method was employed to minimize instances of false-positive cases. CTQ total scores were utilized in regression analyses to examine the proposed
mediational model. Finally, post hoc exploratory analyses were conducted using cut scores for the CTQ clinical subscales to examine the influence of different types of maltreatment experiences on maternal sensitivity.

In addition to providing five clinical scales and a total score, the CTQ also includes a Minimization/Denial scale. This scale, yielding possible scores of zero to three, provides a measure of respondents’ response style. A score of one or higher on this scale suggests that respondents may be attempting to provide socially desirable responses. Utilizing a college sample, Bernstein and Fink (1996) found that the majority of respondents (75%) received a score of zero on the Minimization/Denial indicating that providing socially desirable responses is relatively uncommon. Of the remaining respondents, 10.9% received a score of 1, 10.9% received a score of 2, and 3.25% received a score of 3 on this scale. In the current study, participant scores on the Minimization/Denial scale were examined to determine the extent to which higher scores are related to the independent variables. That is, the CTQ minimization score was used as a covariate to remove the influence of providing socially desirable responses on both the independent and dependent variables.

The CTQ has yielded both excellent reliability and validity. Internal consistency coefficients range from .63 (Physical Neglect) to .93 (Sexual Abuse). Test-retest reliability was determined based on an administration interval of two to six months and yielded mean stability coefficients of .80 indicating that the CTQ has good consistency (Bernstein et al., 1994). Evidence of validity of the CTQ was determined, in part, through exploratory factor analysis of the original 70-item version and yielded four factors with adult respondents (Bernstein et al., 1994) and five factors with adolescent respondents.
(Bernstein, Ahluvalia, Pogge, & Handelsman, 1997). Criterion related validity was established using an adolescent sample in which therapist trauma ratings were compared to responses on the CTQ. Results indicated that respondent CTQ score were highly correlated with therapist trauma ratings (Bernstein et al., 2003).

Beck Depression Inventory-II (BDI-II). The Beck Depression Inventory-II (BDI-II) is a widely used self-report measure of depressive symptoms (see Appendix C) (Beck, Steer, & Brown, 1996). Respondents endorse each of the BDI-II’s 21 items on a 4-point scale, (0 = not present to 3 = severe) to assess the severity of depressive symptoms over the past two weeks. Items on the BDI-II are designed to capture symptoms of depression as specified by the Diagnostic and Statistical Manual, Fourth Edition (DSM-IV). Item responses are summed with subsequent total scores ranging from 0 to 63. BDI-II total scores provide an indication of the depression severity with scores higher than 13 indicating the presence of clinically relevant symptoms of depression. In the current study, the BDI-II total score was used to quantify current symptoms of maternal depression.

Reliability of the BDI-II was established using both clinical and non-clinical samples. Internal consistency coefficients ranged from .39 to .70 for clinical respondents and .27 to .74 for non-clinical respondents. Test-retest reliability was examined using a small clinical sample and 1 one week interval between test administrations yielding excellent reliability (r = .93). Convergent and discriminant validity of the BDI-II was also examined. Comparison of the BDI-II to the Revised Hamilton Psychiatric Rating (HRSD-R) resulted in a correlation coefficient of .71 indicating that the BDI-II has good convergent validity. Discriminant validity was determined through comparison of the
BDI-II to the Revised Hamilton Anxiety Rating Scale, yielding a correlation coefficient of .47 suggesting that each measure is tapping into two discrete constructs.

**Demographic Information.** Research personnel completed the Demographics Form (see Appendix D) with each participant during the baseline study visit. This form was created by the investigative team to record participant age, race, ethnicity, marital and education status, income, legal involvement, and receipt of services (e.g., Medicaid, food stamps, etc.). Information obtained on the demographics form used in this study include participant date of birth, race and ethnicity, marital status, highest level of educational attainment, current employment status, and household yearly income.

Demographic data was examined in several ways in the current study. First, means and standard deviations were calculated to provide a statistical description of study participants. Next, t-tests and chi-square analyses were conducted to determine if there were significant differences between maltreatment groups. Finally, means and standard deviations derived from the demographic data were examined using t-tests and chi square analyses to determine the presence of significant relationships with both maternal responses to the IFEEL pictures and maternal depression symptoms.

**Procedure**

The Institutional Review Board (IRB) at Cincinnati Children’s Hospital Medical Center (CCHMC) approved the parent study (See Appendix D) and the author’s use of the database for the current study. The Xavier University Institutional Review Board (IRB) also approved the current study (see Appendix E). Data for the current study was based on participants who participated in the parent study, conducted with mothers currently enrolled in ECS. Home visitors or family assessment workers presented
mothers who were newly enrolled in ECS with information about the study during their first home visit and contacted study personnel with contact information for those mothers who were interested in participating in the study. Study personnel contacted interested mothers and provided further detail about participation in the present study. Those mothers who continued to express interest in participation were scheduled for a baseline study visit. During this first study visit, study personnel completed informed consent procedures with potential participants. Mothers still interested in participating in the study, signed the consent document and the first study visit was completed including administration of the measures included in the present study. Participants included in the current study did not complete a separate consent form. Mothers received $25.00 in cash for completion of this study visit. All data used for the present study were de-identified such that participants were identified by number only. All data were stored in a password protected database.

Results

Participants in the current study provided more responses in the joy category ($M = 5.26$, $SD = 2.80$) compared to the normative sample ($M = 3.36$, $SD = 1.30$). T-tests and chi-square analyses revealed no significant differences between mothers in the none to low and the moderate to severe maltreatment groups on any of the demographic variables. A significant difference between maltreatment groups was found regarding depressive symptoms as measured by the BDI II, $t(101) = -3.51, p < .01$. On average, mothers in the moderate to severe maltreatment group reported significantly greater symptoms of depression ($M = 14.04$, $SD = 8.17$) compared to mothers in the none to low group ($M = 9.09$, $SD = 6.10$). There was a significant difference between maltreatment
groups on the CTQ total score, $t(101) = -9.60, p = .00$ with participant in the moderate to severe group reporting higher CTQ total scores ($M = 56.35, SD = 20.49$) compared to participants in the none to low group ($M = 29.13, SD = 3.63$).

Participant responses on the CTQ include a Minimization/Denial subscale score indicating the extent to which respondents may be providing socially desirable responses. An independent samples $t$ test revealed a significant difference in CTQ total score between those mothers with a score of zero on the Minimization/Denial scale and those mothers with scores greater than zero, $t(101) = 3.91, p < .01$; those mothers receiving scores greater than zero on the Minimization/Denial scale had lower total scores on the CTQ ($M = 31.70, SD = 1.73$) compared to those mothers receiving a zero on this scale ($M = 46.97, SD = 2.55$). This suggests that mothers with higher scores on the Minimization/Denial scale may have artificially lower scores on the CTQ. Consequently, the CTQ Minimization/Denial score was used as a covariate in statistical analyses.

Descriptive data regarding participant responses to the IFEEL pictures are presented in Table 2. To examine the relationship between maternal maltreatment history and sensitivity to infant facial expressions of emotion, a multivariate analysis of covariance, using maternal CTQ Minimization/Denial subscale scores as a covariate, was conducted. Using the Wilks’s statistic, there was no significant effect of maltreatment status on maternal responses to each of the 13 emotion categories, $\Lambda = 0.86, F(13, 88) = 1.12, p = 35$.

A univariate analysis of covariance was conducted to examine the influence of maltreatment status on the tendency to provide atypical responses for the 13 IFEEL emotion categories with CTQ minimization subscale scores as a covariate. Results
indicate that the maltreatment groups did not differ significantly in the number of atypical responses to the IFEEL pictures, $F(2, 100) = 2.82, p = .06$.

A $t$-test was conducted to determine if participants providing bimodal profiles in response to the IFEEL pictures were more likely to also report more depressive symptoms. Results indicate that participants with bimodal response profiles did not differ significantly from those without bimodal response profiles regarding depressive symptoms, $t (101) = .458, p = .65$.

A mediational model was proposed suggesting that the relationship between childhood maltreatment experiences and sensitivity to infant facial expressions of emotion would be mediated by the presence of maternal depressive symptoms. Baron and Kenny (1986) recommend completing a series of regression analyses to test mediational models. Based on this method, variables hypothesized to mediate the relationship two other variables must meet the following four requirements: (1) the predictor variable or independent variable (in this case, maltreatment group) must demonstrate a significant relationship with the proposed mediator variable (in this case, BDI-II scores) (2) the predictor variable or independent variable must demonstrate a significant relationship with the dependent variable (in this case, IFEEL scores), (3) the proposed mediator variable must demonstrate a significant relationship with the dependent variable, and (4) after statistically controlling for proposed mediating variable, the relationship between the predictor variable or independent variable and dependent variable becomes non-significant. Correlations examining the relationship between maternal maltreatment history (as measured by participants’ total scores on the CTQ), responses to the IFEEL pictures, and participants’ total BDI-II scores were calculated to determine if mediational
analyses were warranted. While maltreatment experiences, as indicated by CTQ total score, were significantly correlated the BDI-II total score, $r = .40$, $p < .01$, current symptoms of depression were related to only to the IFEEL category of anger, $r = -.20$, $p < .01$; maltreatment experiences were not significantly related to any of the other 13 IFEEL categories. Thus completion of analyses examining the mediational model was not warranted.

**Post-Hoc Exploratory Analyses**

In order to better inform future research, post hoc analyses were conducted to determine if different kinds of maltreatment experiences exert unique influences on maternal sensitivity to facial expressions of emotion, which some previous studies have found (e.g., Pine et al., 2005; Pollak, Cicchetti, Hornung, & Reed, 2000; Pollak, Messner, Kistler, & Cohn, 2009).

Bivariate correlations were conducted to examine any potential relationship between participants’ raw scores on each of the clinical subscales of the CTQ and responses for each of the 13 IFEEL emotion categories, yielding a number of small but significant relationships. Higher scores on the Emotional Abuse subscale were significantly related to providing more responses in the fear category, $r = .26$, $p < .01$ while higher scores on the sexual abuse subscale were significantly related to more responses in both the shame category, $r = .33$, $p < .01$ and the disgust category, $r = .21$, $p < .05$. Emotional neglect was positively related to responses in the surprise category, $r = .23$, $p < .01$, while Physical Neglect was positively related to responses in the disgust category, $r = .23$, $p < .05$. CTQ total scores were not positively related to responses in any of the 13 IFEEL emotion categories.
To examine whether types of maltreatment experience (i.e., physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect) were related to responses on the IFEEL pictures, several independent sample t-tests were conducted. Results indicate the presence of several significant relationships. Mothers experiencing moderate to severe emotional abuse provided more responses in the fear category ($M = 1.96, SD = 1.92$) compared to mothers in the none to low group ($M = 1.16, SD = 1.54$), $t = -2.20, p < .05$. The same pattern was detected with regards to physical abuse. Mothers endorsing moderate to severe experiences of physical abuse provided more responses in the fear category ($M = 2.04, SD = 1.90$) compared to mothers in the none to low group ($M = 1.13, SD = 1.54$), $t = -2.49, p < .05$. Significant differences were not found for sexual abuse and emotional or physical neglect. While these analyses yielded significant results, they should be interpreted with caution given the possibility of Type I errors.

**Discussion**

Previous research has identified a relationship between experiences of childhood maltreatment and SIP biases in response to interpreting facial expressions of emotion (e.g. Pine et al., 2005; Pollak, Cicchetti, Hornung, & Reed, 2000; Pollak, Messner, Kistler, & Cohn, 2009 Pollak & Sinha, 2002;). While this relationship has previously been explored in maltreated children, literature examining the long-term effects of experiences of childhood maltreatment on sensitivity to facial expressions of emotion in adults is lacking. The aim of the present study was to explore the potential relationship between experiences of childhood maltreatment and maternal sensitivity to infant facial expressions of emotion, thus adding to the existing literature.
Although differences between maltreatment groups in the current study were not found in SIP biases in reading infant facial expressions of emotion, the larger literature suggests that these differences are present in other populations. Therefore, it is important to discuss the limitations of the current study which may account for these discrepant results. First, the sample differs substantially from the normative sample used in the development of the IFEEL pictures. Participants in the current study were first-time mothers voluntarily participating in a child abuse prevention program. Participants had at least one sociodemographic risk factor that places them at-risk for poor parenting outcomes. While these mothers are at-risk for poor outcomes, including deficits in reading emotional cues, they have volunteered to participate in a program designed to increase parenting competence suggesting greater motivation to increase their parenting skills compared to other demographically similar mothers who do not join such programs. It is possible that they represent a distinct subgroup with normal capacity in reading infant emotional cues relative to non-participants with similar demographic risks. As a result, there may be a diminished association between childhood maltreatment history and sensitivity to facial expressions of emotion.

Second, the measures used may be less valid in this sample of home visited mothers. The IFEEL pictures were normed on a higher SES group. Completion of the IFEEL assessment requires both sufficient verbal skills and emotional labeling capacity to generate responses and complete the measure as it is intended. In contrast, this population of undereducated mothers may have greater difficulty describing infant facial expressions due to limitations in vocabulary and emotional labeling capacity. A comparison of responses provided by the normative sample and those provided by
participants in the current study on the 13 IFEEL emotion categories revealed a number of differences. Specifically, there were two emotion categories in which participants in the current study differed by more than one standard deviation from the IFEEL normative sample. Participants provided fewer responses in the interest category ($M = 3.60$) compared to the normative sample ($M = 7.23$, $SD = 3.42$) and more responses in the joy category ($M = 5.26$) compared to the normative sample ($M = 3.36$, $SD = 1.30$). Future studies with this population should use measures of sensitivity that are less reliant on verbal skills, such as observed interactions between mothers and children. The CTQ also has possible validity problems with this population. The CTQ is a retrospective self-report measure with some items that ask respondents to report whether or not they experienced a specific form of maltreatment while other items ask respondents to provide their perceptions of previous experiences (e.g., “I believe I was emotionally abused”). Retrospective self-reports of childhood maltreatment may be subject to the respondent’s ability to accurately recall childhood events. Future research should consider other, perhaps more sensitive indicators of childhood maltreatment, such as substantiated reports of child abuse and neglect.

Third, it is possible the study was underpowered to detect small to moderate effect sizes. Indeed, a sample size analysis found that 150 subjects would have been required to obtain a significant MANCOVA given the observed differences between groups. Furthermore, there is reason to believe that maltreatment groups were likely more similar than different. As groups were formed based on cut-offs of continuous scores, and the majority of mothers reported some experiences of abuse and neglect, the selected groups (None to Low vs. Moderate to Severe) were not as distinct as would be desired. This
decreases statistical power and in all likelihood made it more difficult to detect group differences.

Finally, there are other potential contributions to our negative findings. It is possible that the IFEEL assessment was administered incorrectly thereby undermining the validity and reliability of the instrument. This is unlikely given that all research personnel were extensively trained and closely supervised by the investigator in both administration and scoring of the IFEEL. It is also possible that other confounding variables made it more difficult to detect differences between groups. Participants may have experienced other adverse events or forms of interpersonal violence between childhood and enrollment in home visiting that were not measured by the CTQ and which could have an impact on ability to sensitively detect infant facial expressions of emotion. Mental health problems (other than depression, which was measured in the current study) may also have affected sensitivity to infant emotional expressions independent of childhood maltreatment experiences. Future research should consider, measure, and control for the influence of events other than childhood maltreatment on SIP biases.

Post-hoc analyses revealed several significant findings that warrant further consideration. Correlations between total CTQ subscale scores (i.e. emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect) and total responses for each of the 13 IFEEL emotion categories revealed a number of significant coefficients. Mothers with higher scores on the sexual abuse subscale provided more responses in the shame and disgust emotional categories. Higher scores on the emotional abuse subscale were significantly related to more responses in the fear category while physical neglect was positively related to more responses in the disgust category. In
addition to correlational analyses, t-tests were conducted to further examine the relationship between different types of childhood maltreatment experienced and ability to interpret infant facial expressions of emotion. Results indicate that mothers with moderate to severe experiences of emotional abuse and physical abuse provided more responses in the fear category compared to mothers in the none to low groups. These findings should be interpreted with caution given the large number of analyses conducted, thereby potentially inflating Type I error rates. Although effect sizes were small to moderate, results of both correlations and mean comparison analyses are consistent with theory and with previous research that has found similar relationships between maltreatment experiences and sensitivity to facial expressions of emotion in children (e.g., Masten et al., 2008; Pollak, Messner, Kistler, & Cohn, 2009). Future research should examine the unique influence of different types of maltreatment experiences (i.e., physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect) rather than global indicators of maltreatment experiences on maternal sensitivity to infant facial expressions of emotion.

This study had a number of strengths. First, based on an extensive literature review, this is the first study to examine the continued influence of childhood maltreatment experiences on maternal sensitivity to infant facial expressions of emotion. While there has been a substantial amount of research examining the effects of maltreatment in children with regards to sensitivity to facial expressions of emotion (e.g., Pollak, Messner, Kistler, & Cohn, 2009) there is a dearth of literature examining this relationship in adults. Those that have focused on the continued impact of childhood maltreatment on recognition of facial expressions of emotion have focused on college
students (Gibb, Schofield, & Coles, 2009). Subsequently findings may not be applicable
to higher-risk populations. Second, this study has focused attention on a particular sample
that is not often the subject of focus in the literature. Specifically, this is a sample of
sociodemographically high-risk, first-time mothers. Such individuals do not frequently
come to the attention of researchers. Third, measures in this study included one that
required the participants to respond to a stimulus as opposed to being comprised solely of
self-report instruments.

Research examining the continued influence of childhood maltreatment
experiences on parenting, in particular maternal sensitivity to infant cues and behaviors,
is warranted. Future studies should consider the unique influence of specific types of
maltreatment experiences on parenting behavior. For example, subsequent research might
examine the discrete impact of childhood experiences of physical, sexual, and emotional
abuse in addition to physical and emotional neglect on parenting behaviors. Such
research could inform identification of mothers at risk for maladaptive parenting
behaviors. Furthermore, studies that examine the relationship between maltreatment
history and maternal sensitivity to emotions could serve to inform interventions targeting
parenting deficits in this population.
References


Doi: 10.1016/j.jad.2011.04.015

doi.org/10.1037/0022-3514.51.6.1173


Table 1

Demographic Characteristics of Study Participants By Maltreatment Group

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>None to Low Maltreatment Group ( (n = 54) )</th>
<th>Moderate to Severe Maltreatment Group ( (n = 49) )</th>
<th>Total Sample ( (n = 103) )</th>
<th>Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>21.15 (4.58)</td>
<td>21.35 (4.05)</td>
<td>21.25 (4.32)</td>
<td>( t = -.24 )</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>45 (83.3%)</td>
<td>38 (77.6%)</td>
<td>83 (80.6%)</td>
<td>( X^2 = 1.02 )</td>
</tr>
<tr>
<td>African</td>
<td>7 (13.0%)</td>
<td>7 (14.3%)</td>
<td>14 (13.6%)</td>
<td></td>
</tr>
<tr>
<td>American</td>
<td>2 (1.9%)</td>
<td>4 (3.9%)</td>
<td>6 (5.8%)</td>
<td></td>
</tr>
<tr>
<td>Biracial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yrs. of Education</td>
<td>12.06 (1.85)</td>
<td>11.69 (1.97)</td>
<td>11.88 (1.91)</td>
<td>( t = .96 )</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>7 (13.0%)</td>
<td>7 (14.3%)</td>
<td>14 (13.6%)</td>
<td>( X^2 = 1.87 )</td>
</tr>
<tr>
<td>Single, never married</td>
<td>44 (81.5%)</td>
<td>41 (83.7%)</td>
<td>85 (82.5%)</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>1 (1.9%)</td>
<td>1 (2.0%)</td>
<td>2 (1.9%)</td>
<td></td>
</tr>
<tr>
<td>Separated</td>
<td>2 (3.7%)</td>
<td>0 (0.0%)</td>
<td>2 (1.9%)</td>
<td></td>
</tr>
<tr>
<td>Household Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $3,000</td>
<td>14 (26.0%)</td>
<td>11 (22.4%)</td>
<td>25 (24.2%)</td>
<td>( X^2 = 6.73 )</td>
</tr>
<tr>
<td>$3,001-$9,000</td>
<td>9 (16.7%)</td>
<td>6 (12.2%)</td>
<td>15 (14.5%)</td>
<td></td>
</tr>
<tr>
<td>$9,001-$20,000</td>
<td>12 (22.2%)</td>
<td>12 (24.5%)</td>
<td>24 (23.4%)</td>
<td></td>
</tr>
<tr>
<td>$20,001-$30,000</td>
<td>10 (18.5%)</td>
<td>8 (16.3%)</td>
<td>18 (17.4%)</td>
<td></td>
</tr>
<tr>
<td>$30,001-$40,000</td>
<td>6 (11.1%)</td>
<td>4 (8.2%)</td>
<td>10 (9.6%)</td>
<td></td>
</tr>
<tr>
<td>Over $40,000</td>
<td>0 (0.0%)</td>
<td>3 (6.1%)</td>
<td>3 (3.0%)</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>28 (52.5%)</td>
<td>25 (51.0%)</td>
<td>53 (51.8%)</td>
<td>( X^2 = 2.50 )</td>
</tr>
<tr>
<td>Employed full-time</td>
<td>13 (24.1%)</td>
<td>13 (26.5%)</td>
<td>26 (25.3%)</td>
<td></td>
</tr>
<tr>
<td>Employed part-time</td>
<td>12 (22.2%)</td>
<td>8 (16.3%)</td>
<td>20 (19.3%)</td>
<td></td>
</tr>
<tr>
<td>Leave of absence</td>
<td>1 (1.9%)</td>
<td>3 (6.1%)</td>
<td>4 (4.0%)</td>
<td></td>
</tr>
<tr>
<td>BDI-II Total</td>
<td>9.09 (6.09)</td>
<td>14.04 (8.17)</td>
<td>11.45 (7.54)</td>
<td>( t = -3.51 )</td>
</tr>
</tbody>
</table>

Note: * = \( p \leq .01 \)
Table 2

*IFEEL* Pictures Data: Mean Number of Responses By Category

<table>
<thead>
<tr>
<th>Emotion</th>
<th>None to Low Maltreatment Group (n = 54)</th>
<th>Moderate to Severe Maltreatment Group (n = 49)</th>
<th>Total Sample (n = 103)</th>
<th>Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surprise</td>
<td>1.89 (1.80)</td>
<td>2.33 (1.96)</td>
<td>2.10 (1.88)</td>
<td>( F = .88 )</td>
</tr>
<tr>
<td>Interest</td>
<td>3.56 (3.86)</td>
<td>3.65 (2.45)</td>
<td>3.60 (3.25)</td>
<td>( F = .31 )</td>
</tr>
<tr>
<td>Joy</td>
<td>5.46 (2.96)</td>
<td>5.04 (2.64)</td>
<td>5.26 (2.80)</td>
<td>( F = .68 )</td>
</tr>
<tr>
<td>Content</td>
<td>3.94 (3.54)</td>
<td>2.84 (1.93)</td>
<td>3.42 (2.93)</td>
<td>( F = 3.16 )*</td>
</tr>
<tr>
<td>Passive</td>
<td>1.39 (1.79)</td>
<td>2.00 (1.84)</td>
<td>1.68 (1.83)</td>
<td>( F = 1.49 )</td>
</tr>
<tr>
<td>Sad</td>
<td>4.67 (2.76)</td>
<td>4.78 (3.30)</td>
<td>4.72 (3.01)</td>
<td>( F = .05 )</td>
</tr>
<tr>
<td>Cautious</td>
<td>1.70 (2.20)</td>
<td>2.10 (1.95)</td>
<td>1.89 (2.08)</td>
<td>( F = .57 )</td>
</tr>
<tr>
<td>Shame</td>
<td>.09 (.35)</td>
<td>.10 (.51)</td>
<td>.10 (.43)</td>
<td>( F = .15 )</td>
</tr>
<tr>
<td>Disgust</td>
<td>.06 (.08)</td>
<td>.08 (.28)</td>
<td>.07 (.25)</td>
<td>( F = .70 )</td>
</tr>
<tr>
<td>Anger</td>
<td>2.09 (1.95)</td>
<td>1.76 (1.45)</td>
<td>1.93 (1.73)</td>
<td>( F = 2.05 )</td>
</tr>
<tr>
<td>Distress</td>
<td>2.56 (2.03)</td>
<td>2.47 (1.80)</td>
<td>2.51 (1.91)</td>
<td>( F = .40 )</td>
</tr>
<tr>
<td>Fear</td>
<td>1.15 (1.63)</td>
<td>1.63 (1.72)</td>
<td>1.38 (1.68)</td>
<td>( F = 1.59 )</td>
</tr>
<tr>
<td>Other</td>
<td>1.26 (1.82)</td>
<td>1.18 (1.89)</td>
<td>1.22 (1.85)</td>
<td>( F = 1.64 )</td>
</tr>
</tbody>
</table>

Note: \( * = p < .05 \)
Table 3

Bivariate Correlations: BDI-II, CTQ, and IFEEL

<table>
<thead>
<tr>
<th>Measure</th>
<th>BDI-II</th>
<th>CTQ</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDI-II</td>
<td>1</td>
<td>-0.45**</td>
<td>-0.15</td>
<td>-0.15</td>
<td>-0.19</td>
<td>-0.10</td>
<td>0.08</td>
<td>0.08</td>
<td>-0.01</td>
<td>0.04</td>
<td>0.04</td>
<td>-0.30</td>
<td>-0.05</td>
<td>-0.17</td>
<td>-0.04</td>
</tr>
<tr>
<td>CTQ</td>
<td>-0.45**</td>
<td>1</td>
<td>-0.17</td>
<td>-0.01</td>
<td>-0.08</td>
<td>-0.18</td>
<td>0.03</td>
<td>0.03</td>
<td>-0.01</td>
<td>0.03</td>
<td>0.17</td>
<td>-0.09</td>
<td>-0.17</td>
<td>-0.02</td>
<td></td>
</tr>
<tr>
<td>Sensitive</td>
<td>0.15</td>
<td>0.17</td>
<td>1</td>
<td>-0.07</td>
<td>-0.28**</td>
<td>-0.29**</td>
<td>-0.01</td>
<td>0.13</td>
<td>-0.01</td>
<td>-0.01</td>
<td>0.03</td>
<td>0.04</td>
<td>-0.20</td>
<td>0.27</td>
<td>-0.06</td>
</tr>
<tr>
<td>Category A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insecure</td>
<td>0.15</td>
<td>0.14</td>
<td>0.07</td>
<td>1</td>
<td>-0.42**</td>
<td>0.15</td>
<td>0.02</td>
<td>0.10</td>
<td>-0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>-0.22**</td>
<td>0.02</td>
<td>-0.07</td>
<td>-0.07</td>
</tr>
<tr>
<td>Category B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sky</td>
<td>-0.14</td>
<td>-0.13</td>
<td>-0.28**</td>
<td>-0.45**</td>
<td>1</td>
<td>-0.02</td>
<td>-0.33</td>
<td>-0.23</td>
<td>-0.23</td>
<td>-0.08</td>
<td>-0.05</td>
<td>0.04</td>
<td>-0.12</td>
<td>-0.23</td>
<td>-0.09</td>
</tr>
<tr>
<td>Company C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crowded</td>
<td>-0.10</td>
<td>-0.18</td>
<td>-0.28**</td>
<td>-0.45**</td>
<td>1</td>
<td>-0.02</td>
<td>-0.23</td>
<td>-0.25</td>
<td>-0.14</td>
<td>-0.12</td>
<td>0.04</td>
<td>0.06</td>
<td>-0.13</td>
<td>-0.33**</td>
<td></td>
</tr>
<tr>
<td>Company D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passive</td>
<td>0.06</td>
<td>0.05</td>
<td>0.04</td>
<td>0.02</td>
<td>-0.15</td>
<td>-0.25</td>
<td>1</td>
<td>-0.19</td>
<td>-0.10</td>
<td>-0.02</td>
<td>0.13</td>
<td>0.04</td>
<td>-0.14</td>
<td>0.03</td>
<td>0.01</td>
</tr>
<tr>
<td>Company E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strained</td>
<td>0.03</td>
<td>0.13</td>
<td>-0.10</td>
<td>-0.22**</td>
<td>0.22</td>
<td>0.19</td>
<td>-0.21**</td>
<td>0.18**</td>
<td>0.07</td>
<td>-0.10</td>
<td>-0.12</td>
<td>-0.17</td>
<td>-0.44**</td>
<td>-0.39</td>
<td>-0.02</td>
</tr>
<tr>
<td>Company F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sky</td>
<td>-0.01</td>
<td>-0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>-0.21**</td>
<td>0.14</td>
<td>0.10</td>
<td>0.01</td>
<td>0.00</td>
<td>0.10</td>
<td>0.11</td>
<td>0.12</td>
<td>-0.04</td>
<td>-0.29**</td>
<td></td>
</tr>
<tr>
<td>Company G</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secure</td>
<td>0.04</td>
<td>0.05</td>
<td>-0.01</td>
<td>-0.05</td>
<td>-0.12</td>
<td>-0.02</td>
<td>0.07</td>
<td>0.00</td>
<td>1</td>
<td>-0.06</td>
<td>0.04</td>
<td>0.12</td>
<td>-0.08</td>
<td>0.56</td>
<td>-0.00</td>
</tr>
<tr>
<td>Company H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demoralize</td>
<td>0.04</td>
<td>0.17</td>
<td>0.05</td>
<td>0.01</td>
<td>-0.08</td>
<td>0.04</td>
<td>0.13</td>
<td>0.01</td>
<td>0.10</td>
<td>0.06</td>
<td>0.12</td>
<td>0.01</td>
<td>0.17</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Company I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angry</td>
<td>-0.25</td>
<td>-0.10</td>
<td>0.04</td>
<td>0.22**</td>
<td>0.04</td>
<td>0.04</td>
<td>-0.12</td>
<td>-0.11</td>
<td>0.04</td>
<td>-0.12</td>
<td>0.1</td>
<td>-0.23**</td>
<td>0.16</td>
<td>-0.11</td>
<td>-0.16</td>
</tr>
<tr>
<td>Company J</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disperse</td>
<td>-0.09</td>
<td>-0.09</td>
<td>-0.26**</td>
<td>-0.02</td>
<td>-0.12</td>
<td>-0.08</td>
<td>0.14</td>
<td>-0.17</td>
<td>0.12</td>
<td>0.02</td>
<td>-0.25</td>
<td>0.01</td>
<td>0.12</td>
<td>0.04</td>
<td>-0.17</td>
</tr>
<tr>
<td>Company K</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear</td>
<td>0.17</td>
<td>0.17</td>
<td>0.27**</td>
<td>-0.07</td>
<td>-0.23**</td>
<td>0.13</td>
<td>0.02</td>
<td>-0.44**</td>
<td>0.04</td>
<td>0.06</td>
<td>0.07</td>
<td>-0.15</td>
<td>0.04</td>
<td>1</td>
<td>0.04</td>
</tr>
<tr>
<td>Company L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>-0.04</td>
<td>-0.02</td>
<td>0.04</td>
<td>-0.07</td>
<td>-0.09</td>
<td>-0.21**</td>
<td>0.02</td>
<td>-0.19</td>
<td>-0.29**</td>
<td>0.00</td>
<td>0.02</td>
<td>0.15</td>
<td>-0.17</td>
<td>0.04</td>
<td>1</td>
</tr>
</tbody>
</table>

* Significant at the .05 level
** Significant at the .01 level
Figure 1. Frequency distribution of participants’ categorical scores on the CTQ.
Appendix A

The IFEEL Pictures, lexicon, and coding sheets are protected by copyright so they are not reproduced in this document. The IFEEL pictures can be ordered by contacting, Karen Fehringer, Ph.D. at the Graduate School of Public Health, University of Colorado.

The Beck Depression Inventory, Second Edition (BDI-II) is copyright protected so it is not reproduced in this document. The measure is available through Pearson Assessments, Inc. at www.pearsonassessments.com.

The Childhood Trauma Questionnaire (CTQ) is protected by copyright so it is not reproduced in this document. The measure is available through Pearson Assessments, Inc. at www.pearsonassessments.com.
Appendix B

First Years Project
Demographics Form: Baseline

<table>
<thead>
<tr>
<th>STUDY INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit Date: _____  Study ID: ___  ECS Number: ___________</td>
</tr>
<tr>
<td>Condition: __________  Agency: ______________________</td>
</tr>
<tr>
<td>Home Visitor: ______________  RA: ___________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MOTHER'S INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mother's DOB: <em><strong>/</strong></em>/____</td>
</tr>
<tr>
<td>2. Mother's SS Number: <strong><strong><strong>-</strong>__-</strong></strong></td>
</tr>
<tr>
<td>3. Mother's Race (check one)</td>
</tr>
<tr>
<td>4. Mother's Ethnicity:</td>
</tr>
<tr>
<td>- Caucasian  Appalachian</td>
</tr>
<tr>
<td>- African American  Hispanic</td>
</tr>
<tr>
<td>- Native American  None</td>
</tr>
<tr>
<td>- Asian/Pacific Islander</td>
</tr>
<tr>
<td>- Other</td>
</tr>
<tr>
<td>- Bi-Racial</td>
</tr>
<tr>
<td>5. Marital Status:</td>
</tr>
<tr>
<td>- Married</td>
</tr>
<tr>
<td>- Single, never married</td>
</tr>
<tr>
<td>- Widowed</td>
</tr>
<tr>
<td>- Divorced</td>
</tr>
<tr>
<td>- Separated</td>
</tr>
</tbody>
</table>
6. Years of Education Completed: ____________

7. Highest Diploma Earned:  
   - None  
   - High School Diploma  
   - GED  
   - Associate Degree  
   - Bachelor Degree  
   - Masters Degree

8. Current School Enrollment:  
   - Yes  
   - No

9. Most Recent Type of Employment: ____________

10. Current Work Status:  
    - No  
    - No, FOB working  
    - Yes, leave of absence  
    - Yes, part-time (1 - 20 hours)  
    - Yes, full-time (greater than 20 hours)

### HOUSEHOLD INFORMATION

11. Living Arrangements of Mother and Baby (check all that apply)  
    - Alone  
    - With father of baby  
    - With FOB's parents  
    - With relative(s)  
    - Other  
    - With MOB’s parents  
    - With other’s parents  
    - With other partner  
    - With friend(s)

12. Household Composition (check all that apply)  
    - Father of baby  
    - Baby's stepfather  
    - Baby's sisters (include step or half)  
    - Baby's brothers (include half or step)  
    - Other relative  
    - Friend(s)  
    - Paternal grandmother  
    - Paternal grandfather  
    - Mother’s boyfriend  
    - Maternal grandmother  
    - Maternal grandfather

13. Total Number of People Who Live in Household: _______
14. Which of the following categories best describes your total household income for the past year? Include all sources of income from all people in your home.

- $< 3,000
- $3,001 - $6,000
- $6,001 - $9,000
- $9,001 - $12,000
- $12,001 - $15,000
- $15,001 - $20,000
- $20,001 - $30,000
- $30,001 - $40,000
- Over $40,000
- Unknown

**PREGNANCY/BABY INFORMATION**

15. Are you pregnant now?

- No
- Yes

16. Baby's name: ______________________  _____

________________________________________

First

17. Baby's DOB: _____/_____/___________

18. Due Date if still pregnant: _____/_____/___________


20. Baby's Gender: 

- Female
- Male

21. Baby's Race:

- Caucasian
- African American
- Native American
- Asian/Pacific Islander
- Bi-Racial
- Other

22. Baby's Ethnicity:

- Appalachian
- Hispanic
- None
OTHER INFORMATION

23. Have you received any of the following services or assistance in the past year (check all that apply)?

<table>
<thead>
<tr>
<th>Currently</th>
<th>Past 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Currently</th>
<th>Past 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
<tr>
<td>Scratch</td>
<td>Scratch</td>
</tr>
</tbody>
</table>

24. Where do you get most medical care for yourself?
   - Primary care physician (private)
   - Clinic
   - Other
   - No medical care
   - Emergency room

25. When was the last time you got medical care for yourself? ____ / ____

26. Have you had involvement with any of the following in the past 6 months?
   (If there has been any involvement with CPS or law enforcement, please provide more specific details in the space provided below.)
   - CPS (child protective services)
   - Law enforcement
   - None
27. Mother's Hobbies and Interests:

28. Family Information:
Appendix C

Letter of Approval for Parent Study: Issued by Cincinnati Children’s Hospital Medical Center Institutional Review Board

CHILDREN’S Hospital Medical Center Institutional Review Board

NOTIFICATION OF FINAL APPROVAL

PRINCIPAL INVESTIGATOR: Ammerman, Robert Ph.D.
CHMC PROTOCOL: 02-8-31

TITLE OF STUDY: Motivational Enrichment for Home Visitation

(✓) Full Review  ( ) Expedited Review

The protocol and consent form for this study have been approved by the Children’s Hospital Medical Center Institutional Review Board.

Approval Date: November 26, 2002  Termination Date: November 25, 2003

1. The IRB has determined that this is a minimal risk study without potential direct benefit.
2. ( ) Assent must be obtained from participating subjects 11 years of age and over.
3. (✓) Assent need not be obtained from participants.
4. (✓) For this study, one parent must give permission for inclusion of the child (unless the parent is dead, incompetent, unknown, not reasonably available, or if only one has legal responsibility) if the subject is under 18 years of age.
5. ( ) Both parents must give permission for inclusion in this study.
6. ( ) Consent must be obtained for subjects 18 years of age and older.

This approval is granted with the following requirements:

1. The investigator is responsible for reporting adverse events to the Children’s Hospital Medical Center Institutional Review Board:
   a). Deaths and life-threatening problems must be reported to the Children’s Hospital Medical Center Institutional Review Board within two working days (48 hours) and documented in writing within 10 working days.
   b). All serious or unanticipated significant adverse events must be reported in writing within 10 working days.
   c). Minor adverse events can be reported in summary form at the time of submission of the continuing review (Progress Report) or upon completion of the study, whichever comes first.
   d). The investigator may also be responsible for reporting to the sponsor, other agencies, and the Children’s Hospital Medical Center Pharmacy and Therapeutics Committee.
2. The investigator is responsible for submitting a Progress Report for continuing review by the IRB
   a). This must be submitted prior to the termination date as long as the study is active or (b). Upon termination of the study
3. There may be no change or additions to the protocol or consent form, without prior approval of the IRB.
4. Approval by the IRB does not indicate approval by other committees of the Medical Center, (e.g., CRC Scientific Advisory Committee, Radiation Safety Committee, College of Medicine Institutional Review Board).
5. It is the responsibility of the investigator to keep copies of the approved protocol, consent form and all correspondence and all changes pertaining to the study or consent form.

DHHS Assurance: FWA00002988

IRB No. 01

Chairman, Institutional Review Board
Children’s Hospital Medical Center
Cincinnati, Ohio
Appendix D

Approval Letter from Principal Investigator of Parent Study

November 28, 2011

Chairperson, Institutional Review Board
Xavier University
3800 Victory Parkway
Cincinnati, Ohio 45207-1100

RE: IRB submission, Angellque Teeters

To the Chair:

This is to document that I give Angellque Teeters permission to access the archival data from the First Years Project, a study conducted at Cincinnati Children’s Hospital Medical Center. She will be able to obtain necessary demographic and study data as part of her dissertation at Xavier University, and for subsequent publication of results.

Sincerely,

Robert T. Ammerman, Ph.D.
Professor of Pediatrics
University of Cincinnati College of Medicine
Appendix E

Letter of Approval from Xavier University Institutional Review Board for Current Study

November 29, 2011

Angelique Teeters
10006 Dry Fork Road
Harrison, OH 45030

Dear Ms. Teeters:


The IRB has reviewed the revised materials regarding your study, referenced above, and has determined that it meets the criteria for the Exempt from Review category under Federal Regulation 45CFR46. Your protocol is approved as exempt research, and therefore requires no further oversight by the IRB.

If you wish to modify your study it will be necessary to obtain IRB approval prior to implementing the modification. If any adverse events occur, please notify the IRB immediately.

Please contact our office if you have any questions. We wish you success with your project!

Sincerely,

[Signature]

Morell E. Mullins, Jr., Ph.D.
Chair, Institutional Review Board
Xavier University

c: Nick Salsman, advisor
Summary

Title: Effects of Childhood Maltreatment History on Maternal Sensitivity to Infant Facial Expressions of Emotion

Problem: Early childhood experiences can have lasting consequences on developmental trajectories. Previous research has demonstrated a link between experiences of childhood maltreatment and subsequent sensitivity to facial expressions of emotion (e.g., Pollak, Cicchetti, Horning, & Reed, 2000). Experiences of maltreatment have been shown to effect recognition of facial expressions of emotion in children (e.g., Messner, Kistler, & Cohn 2009; Pollak, Cicchetti, Hornung, & Reed, 2000; Pollak, Messner, Kistler, & Cohn, 2009; Shipman, Zeman, Penza, & Champion, 2000). The majority of research has focused on the effects of maltreatment on emotional development in children but largely ignored the question of whether or not those effects observed in childhood extend into adulthood. Existing research suggests the possibility that childhood maltreatment experiences continue to exert an influence on adult recognition of facial expressions of emotion including an attentional bias for angry faces compared to their non-maltreated peers (Gibb, Schofield, & Coles, 2009).

Depression can also yield powerful effects on an individual's ability to tend to and process the social behaviors of others. Previous research has shown that depressed individuals display deficits in recognizing facial expressions of emotion (e.g., Feinberg, Rifkin, Schaffer, & Walker, 1986; Mandal & Bhattacharaya, 1985; Zuroff & Colussy, 1986). Maternal depression has been associated with greater affective expressions of sadness and irritability in interactions with their children (Cohn, Campbell, Matias,
Hopkins, 1989) and engaging in more negative interactions with their children (Gotlib, 1982).

Regardless of the mechanism driving maternal ability to sensitively and accurately read their infant’s signals, this is a requisite skill for optimal mother-child interactions and child development. Consequently, research that attempt to identify deficits in caregiver sensitivity is warranted. The current study examined the effects of both maternal history of childhood maltreatment and maternal depressive symptoms on sensitivity to infant facial expressions of emotion in a sample of first-time, at-risk mothers.

Method: The current study is an archival study comprised of a sample of 103 first-time mothers who were also enrolled in a parent study. Only those participants who completed all of the measures used in the proposed study were included. Participants in the parent study were recruited from Every Child Succeeds, a local home visitation program for first-time, at-risk mothers. Participants were placed into either the none to low or moderate to severe maltreatment group based on their responses to the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1996). Participants also completed the Beck Depression Inventory, Second Edition (BDI-II; Beck, Steer, & Brown, 1996), completed the IFEEL pictures task (Emde, Osofsky, & Butterfield, 1993) and a demographic questionnaire. Mothers received $25.00 for completion of this study visit.

Findings: A MANCOVA was conducted to examine differences between maltreatment groups regarding sensitivity to infant facial expressions of emotion yielding no significant results. To examine differences between maltreatment groups and the tendency to provide atypical responses to the IFEEL pictures, a univariate ANOVA was
conducted and revealed no significant findings. A t-test was conducted to determine if providing a bimodal response pattern to the IFEEL pictures was related to maternal symptoms of depression. This analysis yielded no significant findings. Finally, a mediational model was proposed such that depression was hypothesized to mediate the relationship between childhood maltreatment experiences and sensitivity to infant facial expressions of emotion. Results indicate no significant relationships. Exploratory analyses revealed a number of significant relationships between different types of abuse (i.e. emotional, physical, and sexual abuse and emotional and physical neglect).

Implications: These results provide minimal support for the relationship between maternal maltreatment experiences and sensitivity to infant facial expressions of emotion. However, exploratory analyses suggest that the type of maltreatment experienced may exert unique effects on maternal sensitivity. Previous research has shown that childhood maltreatment experiences impact sensitivity to facial expressions of emotions in children (e.g., Pollak & Kistler, 2001; Pollak, Cicchetti, Hornung, & Reed, 2009; Shipman, Zeman, Penza, & Champion, 2000) and adults (Gibb, Schofield, and Coles, 2009). Given these findings, future research in this area is warranted. Specifically, the impact of type of abuse on parenting behaviors and maternal sensitivity should be systematically examined. Such research would serve to inform both identification of mothers at-risk for poor parenting behaviors and interventions that address these deficits.