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Reward Responsivity in Parenting: Development of a Novel Measure in Mothers

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REWARD RESPONSIVITY IN PARENTING: DEVELOPMENT OF A NOVEL MEASURE IN MOTHERS

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by

Chelsey M. Hartley

2016

To: Dean Michael R. Heithaus
College of Arts, Sciences and Education

This dissertation, written by Chelsey M. Hartley, and entitled Reward Responsivity in Parenting: Development of a Novel Measure in Mothers, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Date of Defense: June 23, 2016

The dissertation of Chelsey M. Hartley is approved.

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Dean Michael R. Heithaus
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Andrés G. Gil
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and Dean of the University Graduate School

Florida International University, 2016

DEDICATION

I dedicate this dissertation to my parents, Daniel, Megan, Colleen, Casey, Sean, Lucy, Mike and all of my friends and family whose love and support made the completion of this project possible.

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I would like to express my utmost appreciation to Dr. Jeremy Pettit. Through his mentorship, I have received excellent training in research and clinical work. I am grateful for his support and guidance throughout graduate school. He has helped me developed my own line of research and prepared me well for a career in clinical science. I would also like to express my appreciation to each of my committee members: Dr. Daniel Bagner, Dr. Andy Pham, and Dr. Chockalingam Viswesvaran. Their feedback and support throughout my entire dissertation project has been instrumental in successfully completing my dissertation project. I would also like to thank my undergraduate research assistants for their time and efforts. Recruitment could not have happened without their assistance.

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ABSTRACT OF THE DISSERTATION

REWARD RESPONSIVITY IN PARENTING: DEVELOPMENT OF A NOVEL MEASURE IN MOTHERS

by

Chelsey M. Hartley

Florida International University, 2016

Miami, Florida

Professor Jeremy Pettit, Major Professor

The purpose of the current dissertation was to develop a measure of mother's reward responsivity in parenting. I proposed that deficits in reward responsivity may contribute to maladaptive parenting behaviors, especially among depressed mothers. Reward responsivity is conceptualized as an individual difference in reactivity to pleasurable stimuli and represents a key motivational component that could contribute to the frequency and quality of mothers' interactions with their infants.

To empirically evaluate the link between mother reward responsivity, behaviors towards their infant, and infant behavior outcomes, a measure of reward responsivity in relation to parenting behavior was needed. The current dissertation addressed this need and developed a self-report measure of reward responsivity in parenting named the Mother Inventory of Reward Experience (MIRE).

The MIRE was evaluated in two studies: the first study was among 31 adolescent mothers (M = 16.97, SD = 1.22) and the second was among 200 adult mothers (M = 28.45, SD = 5.50). Following guidelines on scale development, the development of MIRE started with an initial item pool of 105 items that were examined for psychometric

performance of item mean, item kurtosis and item-total correlations. Seventy-two items were deleted because the mean of the item was at the top or bottom of its range, the kurtosis was above or below the absolute value of three, or the item remainder coefficient was less than 0.3. The remaining 33 items displayed high internal consistency reliability and test re-test reliability over two weeks. Convergent validity was established via a statistically significant correlation with a self-report measure of general reward responsivity. Concurrent validity was established via statistically significant correlations with depressive symptoms, parenting stress, and child behavior. Incremental validity of the MIRE over measures of general reward responsivity was supported via significant predictions of parenting stress, infant positive affectivity, and infant regulatory capacity. These results support the reliability and initial validation of the MIRE. Future directions are presented with a focus on understanding the role of maternal reward responsivity, maternal depression, and parenting behaviors.

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CHAPTER I.

INTRODUCTION

Research that depressed mothers relative to non-depressed mothers display less adaptive parenting behaviors during interactions with their infants is well established (O'Hara 2009). Similarly well-established is that offspring of depressed mothers are at high risk for a host of negative outcomes in infancy, childhood, and adolescence (Bagner, Pettit, Lewinsohn, & Seeley, 2010). What remains unknown is what leads to maladaptive parenting behaviors among depressed mothers.

One variable that may contribute to maladaptive parenting behaviors among depressed mothers is deficits in reward responsivity. Reward responsivity is conceptualized as an individual difference in reactivity to pleasurable stimuli and reward (Bogdan & Pizzagalli, 2012). Reward responsivity represents a key motivational component that could contribute to the frequency and quality of mothers' interactions with their infants and has implications for interventions.

To empirically evaluate the link between mother reward responsivity, maternal behaviors towards their infant, and infant behavior outcomes, a measure of reward responsivity in relation to parenting behavior is needed. The purpose of the present dissertation study was to develop the Mother Inventory of Reward Experience (MIRE), a psychometrically sound, self-report measure of reward responsivity in parenting. Activities toward developing the MIRE were conducted in two samples: a school-based sample of adolescent mothers and a primary care-based sample of adult mothers.

A review of the associations between maternal depression, parenting, and reward responsivity will be provided in the following chapter. Additionally, the theoretical and empirical literature that informed the development of MIRE will be reviewed. The current dissertation represents the first effort to develop a measure of reward responsivity in parenting.

CHAPTER II.

LITERATURE REVIEW

In this chapter, I will review the associations between maternal depression, parenting and reward responsivity. I will begin with a review of the negative impact of maternal depression on child outcomes. Next, I will review the literature on parenting behaviors as a potential mediator of the negative impact of maternal depression on child outcomes. Following this review, I will propose reward responsivity as a potential mediator of the association between maternal depression and suboptimal parenting behaviors, and draw attention to the need for a measure of reward responsivity in parenting. I will conclude this chapter with a summary of the research objectives and hypotheses.

The Negative Impact of Maternal Depression on Offspring

Research has consistently demonstrated that offspring of depressed mothers are at risk for negative outcomes from infancy through adolescence. During infancy, offspring of depressed mothers are more withdrawn, show decreased activity, greater fussiness, fewer positive facial interactions, and more intense and frequent crying episodes compared to infants of non-depressed mothers (Miller, Barr, & Eaton, 1993; Field, Healy, Goldstein, Perry, Bendell, Schanberg, et al., 1988; O'Hara 2009). These behavioral problems are believed to represent manifestations of poor self-regulatory abilities (Field et al., 1988; Cohn, Campbell, Matias, & Hopkins, 1990; Coyl, Roggman, & Newland, 2002; Forman, O'Hara, Stuart, Gorman, & Larsen, 2007). During early to middle childhood, offspring of mothers who were depressed during the first postpartum year display higher levels of internalizing and externalizing behavior problems compared to

offspring of mothers who were not depressed during the postpartum period (Bagner, Pettit, Lewinsohn, & Seeley, 2010). During adolescence, offspring of mothers who were depressed during the first two postpartum years display elevated rates of depression compared to offspring of mothers who were not depressed (Murray, Arteche, Fearon, Halligan, Goddyer, & Cooper, 2011). Thus, maternal depression is associated with offspring behavior problems from infancy through adolescence.

Maternal Depression in Adolescence

Almost one-half million adolescent women give birth each year in the United States (Centers for Disease Control, 2011). Depression is of particular concern in adolescent mothers. The rate of major depressive disorder (MDD) in the first year postpartum falls between 10-15% for adult mothers (Gavin, Gaynes, Lohr, Meltzer-Brody, Gartlehner, & Swinson, 2005; Vesga-Lopez, Blanco, Keyes, Olfson, Grant, & Hasin, 2008), and is approximately doubled for adolescent mothers (Troutman & Cutrona, 1990; Deal & Holt, 1998). Depressed adolescent mothers compared to non-depressed adolescent mothers are more likely to display negative mother-child interactions and less likely to engage in reciprocal mother-infant interactions (Reid & Meadows-Oliver, 2007). Further, offspring of depressed adolescent mothers relative to non-depressed adolescent mothers are more likely to have negative outcomes, including problems with feeding, growth and behavior in preschool (Reid & Meadows-Oliver, 2007).

Adolescent mothers experience higher levels of parenting stress and demonstrate suboptimal parenting skills compared to adult mothers (Sommer, Whitman, Borkowski, Schellenbach, Maxwell, & Keogh, 1993; Coley & Chase-Landsdale, 1998). During

feedings, adolescent mothers are less interactive with their infants than adult mothers, as evidenced by fewer vocalizations, fewer facial expressions and less delight exhibited towards their infants (Culp, Culp, Osofsky, & Osofsky, 1991). Similarly, during play activities, adolescent mothers show less inventiveness, patience, and positive attitudes towards their infants compared to adult mothers (Culp et al., 1991). In a study of 1,702 mothers, adolescent mothers were found to be significantly less supportive, more detached, and more intrusive than adult mothers even after controlling for demographic characteristics (Berlin, Brady-Smith, & Brooks-Gunn, 2002). Given that adolescent mothers have high rates of depression and suboptimal parenting behaviors, the current study included a sample of adolescent mothers. The sample of adolescent mothers is considered an at-risk group in terms of elevated depressive symptoms and parenting problems; therefore, the current study also included a sample of adult mothers to enhance the generalizability of the measure.

Parenting Behaviors During Mother-Offspring Interactions as a Potential Mediator of the Negative Impact of Maternal Depression

Research has highlighted potential mediators through which risk of negative outcomes in offspring of depressed mothers might be transmitted (Goodman & Gotlib, 1999; Hammen, Shih, & Brennan, 2004; Goodman, Rouse, Connell, Broth, Hall, & Heyward, 2011). One potential mediator is parenting behaviors, specifically parenting behaviors that occur during mother-infant interactions. Depressed mothers relative to non-depressed mothers show lower responsivity to their infant's needs (Field et al., 1988) and more impatience and hostility during interactions with their infants (Lovejoy, Graczyk, O'Hare, & Neuman, 2000). Depressed mothers relative to non-depressed

mothers also show fewer positive behaviors during interactions with their infants, including less time smiling, less imitative behaviors, less touching, and less moving of their infant's limbs (Field et al., 1988; Field, Hernandez-Reif, & Diego, 2007). In turn, infants of depressed mothers demonstrate less physical activity, more fussiness, and more negative facial expressions when interacting with their mothers compared to infants of non-depressed mothers (Field et al, 1988; Cohn et al., 1990). Converging evidence from biological measures is consistent with these behavioral indicators of infant distress, as infants of depressed mothers have higher heart rates, higher cortisol levels, and lower vagal tone during mother-infant interactions compared to infants of non-depressed mothers (Field et al., 1988).

There is evidence that parenting behaviors mediate the association between maternal depression and adverse child outcomes such as child social competence and child psychopathology (Goodman & Brumley, 1990; Bifulco, Moran, & Ball, 2002; Coyl et al., 2002). Specifically, Coyl and colleagues (2002) found that maternal depression predicted negative mother-child interactions and frequency of spanking, which in turn predicted poor infant attachment security. Bilfuco and colleagues (2002) found that parental neglect, lack of interest, and abuse fully mediated the relationship between maternal depressive history and offspring psychological disorder. Similarly, Andrews, Brown, and Creasey (1990) found that the relationship between persistent maternal depression and daughters' mental health disorder was fully mediated by daughters' ratings of maternal antipathy, maternal abuse, or maternal neglect. Thus, evidence is accumulating to support maternal parenting behaviors as a mediator of the negative impact of maternal depression on offspring behavior outcomes.

Given the suboptimal parenting behaviors displayed by depressed mothers and evidence that parenting behaviors during mother-offspring interactions mediate the association between maternal depression and offspring negative outcomes, intervening to improve parenting behaviors among depressed mothers represents a potentially promising route to reduce the risk of negative offspring outcomes. Didactic instruction or direct modeling of adaptive parenting behaviors represents one intervention approach (Fewell & Wheeden, 1998), but that approach assumes (a) a knowledge or skills deficit underlies maladaptive parenting behaviors among depressed mothers and (b) the provision of knowledge or skills training will translate to positive parenting behaviors among depressed mothers. Those remain unaddressed empirical assumptions. Indeed, at present it is unclear *how* depressive symptoms interfere with adaptive parenting behaviors among mothers. In the following section, I discuss reward responsivity as a potential mediator of the association between maternal depression and parenting behaviors.

Reward Responsivity: A Potential Mediator of the Association between Maternal Depression and Suboptimal Parenting Behaviors

Reward responsivity is a fundamental aspect of hedonic capacity. It is defined as an individual difference in reactivity to pleasurable stimuli and reward (Bogdan & Pizzagalli, 2009). Reward responsivity includes physiological (e.g., brain function), behavioral (e.g., displayed positive affect) and subjective components (e.g., experience of pleasant mood; Forbes & Dahl, 2012). Reward responsivity can be divided into an anticipatory phase (future), a consummatory phase (present; Henriques & Davidson, 2000; Pizzagalli, Iosifescu, Hallett, Ratner, & Fava, 2008; Sherdell, Waugh, & Gotlib, 2012) and a savoring phase (past or prolonging the present; Bryant, 1989). The

anticipatory phase consists of reward motivation and goal-directed activity targeted at achieving desired outcomes (i.e., desire). The consummatory phase consists of satiation and in-the-moment pleasure (i.e., liking; Pizzagalli et al., 2008; Sherdell et al., 2012). The savoring phase consists of staying in the positive moment and dwelling on past positive events as a way of maintaining present positive emotions. Depressed individuals do not significantly differ in the consummatory phase relative to non-depressed individuals (Sherdell et al., 2012). In the anticipatory phase, depressed individuals relative to non-depressed individuals show significantly lower levels of anticipatory pleasure in reward wanting and motivation to obtain reward (Berridge & Robinson, 1998; Berridge & Robinson, 2003; Sherdell et al., 2012). That is, depressed individuals display low motivation to seek reward but similar levels of pleasure while experiencing reward (Berridge & Robinson, 1998; Berridge & Robinson, 2003; Sherdell et al., 2012). Depressed individuals also show significantly lower levels of savoring the present moment compared to non-depressed individuals (Carver & Johnson, 2009). Neuroimaging studies provide converging evidence of deficits in reward responsivity among depressed individuals via altered brain function in key reward-related areas, the striatum, prefrontal cortex, and amygdala (Forbes & Dahl, 2012).

To my knowledge, reward responsivity has not been evaluated among depressed mothers; however, depressed mothers experience difficulties in motivation to engage with their infant and low levels of positive emotions during interactions with their infant, which are consistent with the possibility of a deficit in maternal reward responsivity (Lovejoy et al., 2000; Field et al., 2007). Deficits in reward responsivity, to the extent they are present, may influence the behaviors displayed by depressed mothers during

interactions with their infants, including low attentiveness to their infants, inconsistent responsiveness to their infants' signals of distress, and lower rates of smiling at and touching their infants (Forman et al., 2007; O'Hara, 2009). Identifying the presence of reward responsivity deficits and how they influence parenting behaviors among depressed mothers could inform models of risk transmission of depression and potentially identify a target for interventions to improve parenting behaviors among depressed mothers. Indeed, it is possible that didactic and/or modeling programs to improve parenting behaviors among depressed mothers may not be as effective to the enactment of positive parenting behaviors if such mothers experience deficits in anticipatory and savory pleasure related to interacting with their infants.

The Need for a Measure of Maternal Reward Responsivity Among Mothers

To identify reward responsivity deficits and examine how they may be associated with mother-infant interactions among depressed mothers, it was necessary to develop a measure of maternal reward responsivity in mother-child interactions as no such measure existed. Current methods of measuring reward responsivity include functional magnetic resonance imaging (fMRI) paradigms, performance-based reward tasks typically involving monetary incentives, and self-report measures (Forbes & Dahl, 2012). Prior to using resource intensive neuroscience methods, such as fMRI paradigms, it was important first to gather behavioral data to establish the presence of reward responsivity deficits with respect to parenting behaviors among mothers. Pizzagalli, Jahn, and O'Shea (2005) developed a brief computer-administered performance task to measure participants' ability to modify their choices as a function of differential reward. Other performance-based reward tasks include a computer presentation by Sherdell and

colleagues (2012) of reward and non-reward stimuli (e.g., humorous vs. non-humorous cartoons) and a task that is used to measure effort to obtain the stimuli.

Only two self-report measures of reward responsivity exist. The Snaith Hamilton Pleasure Scale (SHAPS, Snaith, Hamilton, Morley, Humayan, Hargreaves, & Trigwell, 1995) is a 14-item questionnaire that measures the capacity to experience pleasure in the past few days. The Tripartite Pleasure Inventory (TPI, Leventhal, 2012) is a self-report measure of trait anhedonia for which respondents rate 12 common types of pleasant experiences. For each experience, participants are asked to rate how much pleasure/happiness/enjoyment they usually feel in response to these experiences, how often they usually engage in these experiences, and how strongly they usually want to engage in these experiences. Although measures of general reward responsivity exist, there is no measure of reward responsivity in relation to mother-infant interactions or parenting behaviors in general.

Summary, Research Objectives, and Hypotheses

That depressed mothers relative to non-depressed mothers display less adaptive parenting behaviors during interactions with their infants is well-established. Similarly well-established is that offspring of depressed mothers are at high risk for a host of mediate the negative impact of maternal depression on offspring behavior outcomes. What remains unknown is what leads to maladaptive parenting behaviors among depressed mothers. I propose that deficits in reward responsivity might be one variable that contributes to maladaptive parenting behaviors among depressed mothers, as reward responsivity represents a key motivational component that could contribute to the frequency and quality of mothers' interactions with their infants.

To empirically evaluate the link between mother reward responsivity, maternal behaviors towards their infant, and infant behavior outcomes, a measure of reward responsivity in relation to parenting behavior was needed. The purpose of the present dissertation study was to develop Mother Inventory of Reward Experiences (MIRE), a self-report measure of reward responsivity in parenting behaviors among mothers, and to establish its reliability, factorial validity, convergent validity, concurrent validity, and incremental validity. A measure of reward responsivity specific to parenting behaviors was necessary to develop because general measures of reward responsivity do not capture the specific deficits related to parent-child interactions that have been identified in depressed mothers. The new measure was piloted and refined using a small sample of adolescent mothers drawn from a high school for mothers (Study 1) and then was evaluated in a larger sample of mothers sampled from a pediatric care clinic (Study 2). Incremental validity of the developed measure was examined by evaluating whether it significantly predicted parenting behaviors even when covarying scores from a general measure of reward responsivity. With the development of MIRE, the field will be in a better position to evaluate the links between mother reward responsivity and maternal behavior to inform models of risk transmission and the development and examination of interventions to improve parenting behaviors among depressed mothers.

CHAPTER III

METHODOLOGY: Overview of Study 1 and 2

In this chapter, I will provide an overview of the procedures used for developing a measure. I will describe the methods used in Study 1 and 2 to create the final measure.

Measure Development

In this dissertation study, I followed recommended procedures for developing a self-report measure. Figure 1 presents key steps in measurement development as outlined by Spector (1992).

- Step 1: Defining the construct was determining what the measure was intended to measure (i.e., reward responsivity in parenting).
- Step 2: Designing the measure consisted of developing an initial item pool and response options for MIRE in consultation with experts in the areas of reward responsivity and depression (Dr. Pettit), parenting (Dr. Bagner), and psychometrics (Dr. Viswesvaran). Item development was guided by a theory of reward responsivity among depressed individuals.

After an item pool was developed, experts from their respective areas provided feedback on the items and response choices. Experts were asked to evaluate each item for its appropriateness, representativeness and explicitness. Consistent with recommendations for measurement development, items were reviewed for face validity, content validity, readability, redundancy, language, formatting, and overall suitability

(Spector, 1992). After feedback had been gathered, items were modified (e.g., items reworded, added, dropped).

- Step 3: In Study 1, a self-report measure was created from the modified items and pilot tested in a sample of 12 mothers who were asked to critique the measure. They were asked to complete an evaluation form to provide feedback on item length, wording, response choices and content. The measure was revised based on the respondents' feedback.
- Step 4: The revised measure was administered to a sample of 31 adolescent mothers (see Chapter IV: Participants). After administering the measure, items were preliminarily examined using classical test theory. Internal consistency, test-retest reliability, and convergent and concurrent validity were also preliminarily examined.
- Step 5: In Study 2, the measure was administered to a separate sample of 200 adult mothers to more thoroughly evaluate psychometric properties, convergent and concurrent validity, and factor structure using exploratory factor analysis (EFA; see Chapter VI; Data Analysis; Spector, 1992). An EFA was used to identify the factor structure and whether the identified factors were consistent with the intended subdimensions. A tridimensional measure of reward responsivity was proposed with a factor of anticipatory pleasure (i.e., how much mothers anticipate experiencing pleasure when interacting with their child), a factor of consummatory pleasure (i.e., how much pleasure mothers actually experience when interacting with their child) and a factor of

savory pleasure (i.e., how much mothers try to stay in the positive moment and dwell on the positive). Throughout this dissertation project, the anticipatory pleasure subscale is referred to as *desire*, the consummatory pleasure subscale is referred to as *pleasure* and the savory pleasure subscale is referred to as *savoring*. The research examined reliability and validity; however, normative data was not collected in this initial project. If results of this research study support the reliability and validity of the self-report measure, normative data will be collected in a subsequent larger scale project with a more representative sample of both adolescent and adult mothers.

CHAPTER IV.

METHODOLOGY STUDY 1: Pilot among Adolescent Mothers

In Study 1, the developed measure was piloted in a sample of adolescent mothers. A sample of adolescent mothers was used because adolescent mothers have higher rates of maternal depression, parenting stress and negative parenting behaviors (Sommer et al., 1993; Deal & Holt, 1998; Reid & Meadows-Oliver, 2007). This chapter reports on the sampling strategy and the method used among adolescent mothers in Study 1.

Participants

Adolescent mothers were recruited from the Continuing Opportunities for Purposeful Education (COPE) High School in Miami, Florida. The COPE sample came from a non-residential voluntary program for adolescent women, in which the students must be pregnant or have a child. The school provides a high school education for adolescent mothers while creating a supportive environment to assist them with child care, health care, and occupational experiences. Enrollment at COPE ranges from 70 to 100 students at any given time. Approximately half of the enrolled students are expecting their first child and half already have a child. On the basis of the number of student mothers enrolled in COPE, a sample of 45 adolescent mothers with children between birth to 3 years old was the projected sample size. Children within this age range were recruited because the field of infant mental health refers to infancy as birth to 3 years (Zeanah, 2009) and because transmission of risk is most likely to be identified early on via parenting behaviors with children in this age range.

The inclusion criteria were: (a) between ages 12-21 years, (b) ability to speak and read English fluently and (c) have at least one child between the ages of birth to 3 years

old. The exclusion criterion was: (a) not providing written informed consent (age ≥ 18 years) or written assent and written informed consent from a parent/legal guardian (age < 18).

At the time of recruitment, there were 32 adolescent mothers who were eligible to participate. Of the 32 eligible mothers, 31 (97%) provided consent to participate in the study. Ten mothers were over 18 and provided written informed consent. Twenty-one mothers were under 18 and provided written parental informed consent and written adolescent assent. Demographic information on the 31 adolescent mothers is summarized in Table 1. Participants ranged in age from 15 to 21 years with a mean age of 16.97 years (*SD* = 1.22 years). The majority (61.3%) of the sample was Hispanic. Approximately half (54.8%) of the participants were White, 38.7% were African American, and 6.5% were multi-racial. Ninety-seven percent of the sample was eligible for free or reduced lunch. The mean age of the mothers' children was 15.48 months (*SD* = 10.98 months), with a range of 1 month to 36 months.

Design and Methods

I informed all eligible students at COPE High School of the nature and purpose of the study. All students who expressed interest in participating received a packet that included a parental informed consent form for the student's legal guardian to sign and an assent form for the student to sign (unless the student was 18 years or older, in which case an adult informed consent form was administered). Participants were given ample time to ask questions about the study, and the parent/guardian was given the contact information for me and Dr. Pettit with two weeks to ask questions prior to making a decision whether or not to consent and/or assent to participate in the study. We required

signed assent from the adolescent and signed informed consent from one parent/legal guardian.

After receiving informed consent/assent and/or parental consent, and after an initial item pool for the MIRE was developed (see results for item development), twelve randomly selected mothers from the COPE school were asked to review the measure for wording, response choices, and content. After this review was complete and MIRE had been revised (see Chapter V results for item revisions), the revised measure was piloted among the 31 participants described above. These 31 participants were distinct from the 12 participants who were asked to review the measure for scale development purposes. The 12 participants were recruited in spring of 2015 to critique the measure and the other 31 participants were recruited in fall of 2015.

An initial meeting was scheduled to administer the study measures (see Measures) in a testing room at the school to all participants at the same time. After the initial meeting, another meeting was set up two weeks later to re-administer MIRE for the purpose of collecting data on test-retest reliability. The study procedures involved administering paper and pencil measures, and the items were read out loud to all participants.

Measures

A *Demographic and Background Questionnaire* was administered to record data on participants' age, race, ethnicity, marital status, current grade, current grade point average (GPA), living situation, and current and prior mental health treatment.

Measures for Preliminarily Evaluating Convergent Validity

a. The *Tripartite Pleasure Inventory (TPI, Leventhal, 2012)*, described above, was administered as a self-report measure of general reward responsivity. The TPI consists of three subscales: hedonic responsivity, hedonic engagement and hedonic desire. For hedonic responsivity, respondents rate how much pleasure/happiness/enjoyment they usually feel for 12 pleasant experiences. For hedonic engagement, participants are asked to report how often they usually engage in these 12 experiences. For hedonic desire, participants are asked rate how strongly they usually want to engage in these experiences. Items are ranked on a 5-point Likert scale from 0 (no pleasure/ never) to 4 (extreme pleasure/always). The TPI hedonic responsivity subscale has demonstrated internal consistency of Cronbach's alpha =.77 (psychometric properties of the other subscales have not been published; Leventhal, 2012; Meinzer, Pettit, Leventhal, & Hill, 2012), convergent validity via significant associations with measures of anhedonia (Leventhal, 2012), and concurrent validity via significant associations with measures of depressive symptoms (Leventhal, 2012; Meinzer et al., 2012). Cronbach's alpha in the current sample for the hedonic responsivity, hedonic engagement, and hedonic desire subscales was α=.94, .90, and .95 respectively.

b. The *Savoring Beliefs Inventory (SBI, Bryant 2003)* was administered as a self-report measure of positive mood regulation expectancies. The SBI is a 24-item scale in which participants rate how much they agree or disagree with statements of anticipation, savoring and reminiscing of positive events (e.g., "When something good happens, I can make my enjoyment of it last longer by thinking or doing certain things"). Participants are asked to choose how true each statement is to them on a 7-point scale from "strongly

disagree" to "strongly agree." The SBI has demonstrated internal consistency of Cronbach's alpha ranging from .83 to .94 (Bryant, 2003; Eisner, Johnson, & Carver, 2009), convergent validity via significant associations with measures of constructs related to savoring ability (Bryant, 2003), and predictive validity via significant predictions of how much participants enjoyed a real-world positive event (i.e., high savoring scores predicted higher enjoyment of vacation; Bryant, 2003). In the current sample, Cronbach's alpha was .82.

Measures for Preliminarily Evaluating Concurrent Validity

a. *Center for Epidemiologic Studies Depression Scale (CESD, Radloff, 1977)* was used to assess depressive symptom severity. It is a 20-item self-rating scale. Participants rate the frequency of depressive symptoms experienced in the last week on a 4-point Likert scale ranging from 0 (rarely or none of the time; less than one day) to 3 (most or all of the time; 5-7 days). Scores can range from 0 to 60, with higher scores indicating more severe depressive symptoms. The scale's psychometric properties, including internal consistency and test-retest reliability, and validity have been supported in adolescents (Roberts, Lewinsohn, & Seeley, 1991). Internal consistency in the present sample was Cronbach's alpha =.71.

b. The *Parent Stress Index, Short Form (PSI-SF;* Abidin, 1995*)* was administered. It is a 36-item questionnaire containing three subscales and a total scale score: Parental Distress (PD), Parent–Child Dysfunctional Interaction (PCDI), Difficult Child (DC) and Total Stress (TS). In the current study, all the subscales were used to allow an examination of the associations between the MIRE and different facets of parenting stress, including level of distress related to personal factors (PD subscale),

parents' dissatisfaction with interactions with their children (PCDI subscale), the degree to which parents find their children difficult (DC subscale) and a total score of parenting stress (TS scale). The internal consistency of the PSI-SF has received ample support with Cronbach's alphas ranging from .79 to .93 (Haskett, Ahern, Ward & Allaire, 2006; Graziano, McNamara, Geffken, & Reid, 2011). Cronbach's alpha in the present sample was .82 for the total scale, .83 for the PD subscale, .74 for PCDI subscale, and .69 for DC subscale.

c. For children under 12 months, the *Infant Behavior Questionnaire-Revised Very Short Form (IBQ-R Very Short Form;* Putnam, Helbig, Garstein, Rothbart, Leerkes, 2013) was administered to mothers. The IBQ-R Very Short Form is a 37-item parent-report questionnaire of infant temperament in specific situations during the past 1 to 2 weeks. It contains three subscales: Positive Affectivity/Surgency (PAS), Negative Emotionality (NEG) and Orienting/Regulatory Capacity (ORC). Internal consistency for each subscale has been reported as Cronbach's alpha of PAS=.80, Cronbach's alpha of NEG=.81, and Cronbach's alpha of ORC=.74 (Putnam et al., 2013). Cronbach's alpha in the current sample for the PAS, NEG, and ORC subscales was α=.96, .96, and .95, respectively.

d. For children older than 12 months, the *Infant-Toddler Social and Emotional Assessment (ITSEA; Carter & Briggs-Gowan, 2006)* was administered to mothers. The ITSEA is a 166-item, nationally standardized questionnaire designed to assess behavioral problems and competencies across four domains: externalizing, internalizing, dysregulation, and competence. For the current study, the externalizing and internalizing domains (56 items) were administered which have been reported to have internal

consistency of Cronbach's alpha=.87 and .80, respectively (Carter, Briggs-Gowan, Jones & Little, 2003), and convergent validity via significant associations with other parent-report and observational measures (Carter et al., 2003). In the current study, Cronbach's alpha for the externalizing domain was .84 and Cronbach's alpha for the internalizing domain was .87.

Other Measures. a. The MIRE was administered.

Data Analysis

Missing value analyses conducted in the Statistical Package for the Social Sciences (SPSS) showed minimal missing data (3.85%). To assess missing data bias, a dummy variable reflecting the present or absence of missing data for each variable was created and correlated with all other study variables. No correlation was statistically significant, indicating no evidence of bias caused by missing data. Data were assumed to be missing at random. Multiple imputation averaging across 10 imputation sets was used to handle missing data (Little & Rubin, 1989).

Classical test theory (CTT) was used to examine MIRE. The CTT was used rather than item response theory (IRT) for the following reasons: 1) a smaller sample size was available for analysis; 2) model parameter estimation was conceptually straightforward; and 3) analyses did not require strict goodness-of-fit studies to ensure a good fit of the model to test the data (Hambleton & Jones, 1993). Empirical studies comparing CTT and IRT have found the two measurement frameworks to be comparable and failed to find support that one framework is superior to the other (Fan, 1998; Lin, 2008).

Item analysis

In accordance with CTT, I evaluated the distributions of items and multiple forms of reliability of the MIRE. The purpose of item analysis was to find the items that formed an internally consistent scale and to eliminate the items with poor measurement ability (Spector, 1992). I examined the mean of each item. If an item's mean was at the top or bottom of its range, this meant that nearly all participants gave the same response, resulting in a restricted range of scores and insufficient variability to examine correlations with other measured variables. The item scores ranged from 0 to 4 on the MIRE. Given the small sample size for this sample (n=31), items were only deleted if they had extremely poor performance (i.e., a mean of 0 or 4) because this indicated all participants gave the exact same response.

Kurtosis

I examined the sample for kurtosis. If a large number of participants had the same score on an item, the kurtosis was high. Items with extreme means and high kurtosis (values >|3|) have floor or ceiling artifacts and make little psychometric contribution to a test. Given the small sample size for this sample (n=31), only items with extreme kurtosis (values >|10|) were deleted.

Item-total correlations

I also examined item-total correlations within each of the three proposed subscales to evaluate how well each individual item related to other items in the same subscale. Item-total correlations were examined by calculating the item-remainder coefficient for each item. The item remainder coefficient is the correlation of each item with the sum of the remaining items in the subscale. Items with item-remainder

coefficients less than .30 were removed as to create an index with high-internal consistency (Allen & Yen, 1979; Spector, 1992).

The results from item analysis, kurtosis, and item total-correlations among the adolescent sample are presented in Chapter V.

Reliability

After I examined the MIRE in the adult sample (see Chapter VII), a final measure was created. Using the final measure, I estimated internal consistency reliability using Cronbach's alpha. Cronbach's alpha was calculated for the total score and the three subscale scores. A Cronbach's alpha of 0.70 or higher is generally considered satisfactory, which indicates the measure is of sufficient length and that the items appear to measure similar content (Cronbach & Meehl, 1955; Spector, 1992; Cronbach & Shavelson, 2004). I also examined test-retest reliability over two weeks as an indicator of temporal stability. The Intraclass Correlation Coefficient (ICC) between responses from the first administration to the second administration was calculated to examine test-retest reliability.

Validity

Convergent validity of the MIRE was examined by calculating Pearson product moment correlations between scores on the MIRE, the TPI, and the SBI. Positive and statistically significant correlation coefficients would provide evidence of convergent validity. Concurrent validity of the MIRE was examined by calculating Pearson product moment correlations between scores on the MIRE and the CES-D, the PSI, the IBQ, and the ITSEA. Negative and statistically significant correlation coefficients would provide

evidence of concurrent validity. Analyses of validity in the adolescent mothers sample were considered preliminary with an eye toward informing future studies.

The results of reliability and validity analyses using the final measure in the adolescent sample are presented in Chapter VIII.

CHAPTER V.

RESULTS STUDY 1: Item Analysis

In this chapter, I will present the methods used for development of the MIRE. I begin with the development of the item pool and the modifications made to the item pool. I also will present the mean, kurtosis, and item-remainder coefficients of the MIRE items in the adolescent sample.

Item Pool Development

Guided by the theory of reward responsivity, an initial item pool of 33 items was developed for each of the subscales of the three phases of reward responsivity: desire, pleasure and savoring; resulting in a total of 99 items (see Table 3 for a list). With permission from Dr. Adam Leventhal, I adapted the instructions and response choices from the Tripartite Pleasure Inventory (Levanthal, 2012) to be used in the MIRE. The item stem was the same across all three subscales, but participants were given different instructions and response options for each subscale. Table 3 presents the original item pool, item instructions and response options for each subscale.

For the desire subscale, participants were given the following instructions, "Below is a list of experiences. Consider how you **USUALLY** feel. For each item, please indicate **how strongly you *usually* want to do** the following experiences. Please make your responses based only on your **desire** to experience these situations, regardless of how often you want to do them." The item response options were no desire, mild desire, moderate desire, great desire, and extreme desire.

For the pleasure subscale, participants were given the following instructions, "Now, for each item, please indicate **how much pleasure, happiness, or enjoyment you**

usually **feel in the moment while doing** that type of experience. Check the box that best describes your response." The item response options were no pleasure, mild pleasure, moderate pleasure, great pleasure, and extreme pleasure.

For the savoring subscale, participants were given the following instructions, "Now, for each item, indicate **how much pleasure, happiness, or enjoyment you usually feel when remembering that experience in the past**. Please make your responses based only on how you feel when you **remember** your experience in these situations." The response options were the same response options for the savoring scale: no pleasure, mild pleasure, moderate pleasure, great pleasure, and extreme pleasure.

Given that the item stem was the same across all three subscales, when an item was removed from one subscale, it was also removed from the other two subscales. The same was true when an item was added. After the item pool was developed, Drs. Pettit, Bagner, and Viswesvaran reviewed the item pool for appropriateness, representativeness and explicitness. They provided feedback on the items and response choices. After feedback had been gathered, items were modified: one subscale item was dropped, two subscale items were reworded and nine subscale items were added. Items 33, 66 and 99 ("Bouncing your child") were dropped because one reviewer believed this item could be construed as a positive or negative experience. Items 10, 43, and 76 were reworded from "Reading with your child" to "Reading to your child" and items 14, 47 and 80 were reworded from "Go outside with your child" to "Going outside with your child." Nine items were added as parenting experiences between mothers and their infants: "dressing your child, spending time with your child, cleaning up your child's mess, laughing with your child, singing to your child, cuddling your child, sacrificing your time for your

child, rocking your child, laying down with your child." These deletions and additions resulted in 123 items (41 for each subscale, see Table 4 for items) to be pilot tested.

Study 1 Pilot Test. Twelve adolescent mothers were asked to complete and critique the self-report measure created from the modified item pool. On the basis of adolescent mothers' feedback, 6 of the 41 subscale items (18 of the 123 total items) were removed. Items 12, 53, and 94 ("touching your child") were removed for awkward wording, items 13, 54, and 95 ("speaking to your child") were removed for being redundant with items 6, 47, and 88 ("talking to your child"), and items 25, 66, and 107 ("cleaning your child") were removed for being redundant with items 7, 48, and 89 ("bathing your child"). Six items (two per subscale) were removed because the mothers reported they did not engage in these activities: items 18, 59, and 100 ("listening to your child scream") and items 23, 64, and 105 ("taking your child for a walk"). Items 39, 80 and 121 ("sacrificing your time for your child") were removed because of difficulty understanding the word sacrifice. After the initial pilot testing was complete, 105 total items (35 subscale items, see Table 5 for a list) remained and were pilot tested in a sample of N=31 at COPE.

Thirty-one mothers (see Chapter IV participants) at COPE completed the 105-item self-report measure. Given the small sample size, items were only removed from the results of the pilot test if their performance was extremely poor (see Chapter IV for details).

Item Analysis

Item mean range was from 0 to 4. Results from item analysis led to the deletion of one subscale item (105: "laying down with your child") because the mean of the item

was 4, which meant all participants gave the same answer on this item. As mentioned above, the same item stems are used in each subscale; therefore, when an item is removed from one subscale, it is also removed from the other two subscales. Thus, three total items (item 35, 70 and 105) were removed with the deletion of this item stem.

Kurtosis

Results from the analysis of the kurtosis of items led to the deletion of two subscale items (six total items; 29, 64, 99: "spending time with your child" and 33, 68, 103: "cuddling your child"). The kurtosis values of these items were |24| and |31|, far exceeding the a priori selected value of |10| for removal.

Item-total correlations

The item-remainder coefficient calculated for each item revealed that the same two items that had unacceptably high kurtosis also had low item-remainder coefficients (-.11, -.04). Therefore, no new items were deleted based on examination of item-remainder coefficients.

In sum, nine items (three from each subscale) were removed from this phase of pilot testing. Ninety-six items remained (see Table 6) and were examined in the adult sample, described in the following chapters.

CHAPTER VI.

METHODOLOGY STUDY 2: Adult Mothers

In Study 2, the revised MIRE from Study 1 was administered to a sample of adult mothers to examine the reliability, validity, and factor structure of the MIRE in a larger sample. Chapter VI reports on the sampling strategy and methods used among adult mothers.

Participants

Two hundred adult mothers were recruited from a large outpatient pediatric primary care clinic housed in Miami Children's Hospital (MCH) in Miami, Florida. The inclusion criteria were: (a) ability to speak and read English fluently and (b) have at least one child between the ages of birth and 3 years old. Children within this age range were recruited because the field of infant mental health refers to infancy as birth to 3 years (Zeanah, 2009) and because transmission of risk is most likely to be identified early on via parenting behaviors with children in this age range. The exclusion criterion was: (a) not providing written informed consent.

Of the 373 mothers approached to participate in the study, 200 mothers (53.6%) agreed to participate, 73 mothers (19.6%) declined to participate, and 100 mothers (26.8%) were ineligible because they could not speak and read English fluently (they all were Spanish speaking). Table 2 presents a summary of demographic information. Participants ranged in age from 18 to 45 years with a mean age of 28.45 years (SD = 5.50 years). The majority (71.5%) of the participants were Hispanic. The majority (86.7%) of the participants were White, 9.7% were African American, and the remaining 3.6% were Asian, Native American, or multi-racial. Half of the sample was married (50.5%), 3.1%

were separated or divorced, 23.7% were in a relationship and 22.7% were single. The education level of the mothers was as follows: 8.2% did not complete high school, 19.1% completed high school, 31.4% completed some college or technical school, 25.3% completed college, and 16.0% earned a graduate degree. The mean age of the mother's children was 14.82 months (*SD* = 11.24 months). The mean monthly income was $3,963 (*SD* = $3,129).

Design and Methods

Mothers attend the clinic at Miami Children's Hospital for either a well or sick visit for their children. Dr. Rosa- Olivares', the attending pediatrician at MCH, staff gave me notice of potentially eligible mothers to approach. Upper-level undergraduate research assistants who received training in research, ethics, and study procedures approached mothers of child patients between 0 and 36 months olds to briefly describe the study to them. Subsequently, mothers were asked if they would like to participate in the study. Potential participants were given time to ask questions about the study. Informed consent forms were offered only in English, consistent with requirement that all participants be able to speak English. After receiving informed consent, mothers were given the study measures (see Measures) to complete in the waiting room at the clinic. After completion of the measures, efforts were made to call mothers two weeks later to re-administer MIRE by telephone for the purpose of collecting data on test-retest reliability.

Measures

A *Demographic and Background Questionnaire* was administered to record data on age, race, ethnicity, marital status, employment status, household income, living situation, and current and prior mental health treatment.

Measures for Evaluating Convergent Validity.

a. The *Tripartite Pleasure Inventory (TPI, Leventhal, 2012)*, described above, was administered as a general self-rating measure of reward responsivity. The TPI consists of three subscales: hedonic responsivity, hedonic engagement and hedonic desire. For hedonic responsivity, respondents rate how much pleasure/happiness/enjoyment they usually feel for 12 pleasant experiences. For hedonic engagement, participants are asked to rate how often they usually engage in these experiences. For hedonic desire, participants are asked to rate how strongly they usually want to engage in these experiences. Items are ranked on a 5-point Likert scale from 0 (no pleasure/ never) to 4 (extreme pleasure/always). The TPI hedonic responsivity subscale has demonstrated internal consistency of Cronbach's alpha =.77 (psychometric properties of the other subscales have not been published; Leventhal, 2012; Meinzer et al., 2012), convergent validity via significant associations with measures of anhedonia (Leventhal, 2012), and concurrent validity via significant associations with measures of depressive symptoms (Leventhal, 2012; Meinzer et al., 2012). Cronbach's alpha in the current sample for the hedonic responsivity, hedonic engagement, and hedonic desire was α=.89, .89, and .92, respectively.

b. The *Savoring Beliefs Inventory (SBI, Bryant 2003)* was administered as a self-report measure of positive mood regulation expectancies. The SBI is a 24-item scale in

which participants rate how much they agree or disagree with statements of anticipation, savoring and reminiscing of positive events (e.g., "When something good happens, I can make my enjoyment of it last longer by thinking or doing certain things"). Participants are asked to choose how true each statement is to them on a 7-point scale from "strongly disagree" to "strongly agree." The SBI has demonstrated internal consistency of Cronbach's alpha ranging from .83 to .94 (Bryant, 2003; Eisner et al., 2009), convergent validity via significant associations with measures of constructs related to savoring ability (Bryant, 2003) and predictive validity via significant predictions of how much participants enjoyed a real-world positive event (i.e., high savoring scores predicted higher enjoyment of vacation; Bryant, 2003). In the current sample, Cronbach's alpha was .92.

Measures for Evaluating Concurrent Validity.

a. *Center for Epidemiologic Studies Depression Scale (CESD, Radloff, 1977)* was used to assess depressive symptom severity. It is a 20-item self-rating scale. Participants rate the frequency of depressive symptoms experienced in the last week on a 4-point Likert scale ranging from 0 (rarely or none of the time; less than one day) to 3 (most or all of the time; 5-7 days). Scores can range from 0 to 60, with higher scores indicating more severe depressive symptoms. The scale's psychometric properties, including internal consistency and test-retest reliability, and validity have been supported in adults (Joiner, Walker, Pettit, Perez, & Cukrowicz, 2005). Cronbach's alpha in the present sample was .86.

b. The *Parent Stress Index, Short Form (PSI-SF;* Abidin, 1995) was administered. It is a 36-item questionnaire that contains three subscales and a total scale

score: Parental Distress (PD), Parent–Child Dysfunctional Interaction (PCDI), Difficult Child (DC) and Total Stress (TS). In the current study, all the subscales were used to all an examination of the associations between the MIRE and different facets of parenting stress, including level of distress related to personal factors (PD subscale), parents' dissatisfaction with interactions with their children (PCDI subscale), the degree to which parents find their children difficult (DC subscale) and a total score of parenting stress (TS scale). The internal consistency of the PSI-SF has received ample support with Cronbach's alpha ranging from .79 to .93 (Haskett et al., 2006; Graziano et al., 2011). Cronbach's alpha in the present sample was .93 for the total scale, .84 for the PD subscale, .89 for PCDI subscale, and .86 for DC subscale.

Measures for Evaluating Child Behaviors.

Two measures of infant behavior were administered. These were used to examine the association between reward responsivity in parenting and infant behavioral problems to inform models of risk transmission.

a1. For children under 12 months, the *Infant Behavior Questionnaire-Revised Very Short Form (IBQ-R Very Short Form;* Putnam et al., 2013) was administered to mothers. The IBQ-R Very Short Form is a 37-item parent-report questionnaire of infant temperament in specific situations during the past 1 to 2 weeks. It contains three subscales: Positive Affectivity/Surgency (PAS), Negative Emotionality (NEG) and Orienting/Regulatory Capacity (ORC). Internal consistency for each subscale has been reported as Cronbach's alpha of PAS=.80, NEG=.81, and ORC=.74 (Putnam et al., 2013). Cronbach's alpha in the current sample for the PAS, NEG, and ORC subscales was α=.69, .88, and .66, respectively.

a2. For children older than 12 months, the *Infant-Toddler Social and Emotional Assessment (ITSEA; Carter & Briggs-Gowan, 2006)* was administered to mothers. The ITSEA is a 166-item, nationally standardized questionnaire designed to assess behavioral problems and competencies across four domains: externalizing, internalizing, dysregulation, and competence. For the current study, the externalizing and internalizing domains (56 items) were administered, which both have shown to have adequate internal consistency (Cronbach's alpha=.87 and .80 respectively; Carter et al., 2003) and convergent validity via significant associations with other parent-report and observational measures (Carter et al., 2003). In the current study, Cronbach's alpha for the externalizing domain was .91 and Cronbach's alpha for the internalizing domain was .87.

Other Measures. a. The MIRE was administered.

Data Analysis

Missing value analyses conducted in the Statistical Package for the Social Sciences (SPSS) showed a small amount of missing data (13.26%). To assess missing data bias, a dummy variable reflecting the present or absence of missing data for each variable was created and correlated with all other study variables. No correlation was statistically significant, indicating no evidence of bias because of missing data. Data were assumed to be missing at random. Multiple imputation averaging across 10 imputation sets was used to handle missing data (Little & Rubin, 1989).

Classical test theory (CTT) was used to examine MIRE. The CTT was used rather than item response theory (IRT) for the following reasons: 1) a smaller sample size was available for analysis; 2) model parameter estimation was conceptually straightforward; and 3) analyses did not require strict goodness-of-fit studies to ensure a

good fit of the model to test the data (Hambleton & Jones, 1993). Empirical studies comparing CTT and IRT have found the two measurement frameworks to be comparable and failed to find support that one framework is superior to the other (Fan, 1998; Lin, 2008).

Item analysis. In accordance with CTT, I evaluated the distributions of items and multiple forms of reliability of MIRE. The purpose of item analysis was to find the items that formed an internally consistent scale and to eliminate the items with poor measurement ability (Spector, 1992). I examined the mean of each item. If an item's mean was at the top or bottom of its range, nearly all respondents gave the same response, resulting in a restricted range of scores and insufficient variability to examine correlations with other measured variables. The item scores ranged from 0 to 4 on the MIRE. There is no standardized cutoff score for extreme means; however, following the recommendation of Allen and Yen (1979), I deleted items that had a mean below .25 or above 3.75. A different threshold was used in Study 2 than Study 1 because Study 1 was used to preliminarily examine item performance because of the small sample size (n=31); therefore, items were removed from Study 1 only if there was no variance across participants (i.e., if all participants gave the exact same response on an item).

Kurtosis. I examined the kurtosis of items among each sample separately. If a large number of participants all had the same score on an item, the kurtosis was high. Items with extreme means and high kurtosis (values >|3|) have floor or ceiling artifacts and make little psychometric contribution to a test; therefore, these items were removed in the current study.

Item-total correlations. I also examined item-total correlations to evaluate how well each item related to other items in the same subscale. Item-total correlations were examined by calculating the item-remainder coefficient for each item. The item remainder coefficient is the correlation of each item with the sum of the remaining items in the subscale. Items with item-remainder coefficients less than .30 were removed as to create an index with high-internal consistency (Allen & Yen, 1979; Spector, 1992).

Exploratory Factor Analysis. An exploratory factor analysis (EFA) was performed using principal component analysis with an oblique rotation. Oblique rotation was used because I expected that factors would be correlated. Parallel analysis was performed by means of syntax created and made available by O'Connor (2000). One thousand randomized permutations of the MIRE data were used to create a set of the mean eigenvalues and the corresponding 95th percentile eigenvalues. The eigenvalues from the raw data were retained if they were greater than the 95th percentile eigenvalues created from the randomized dataset. Once the number of factors was determined, a coefficient level of .32 or above was used to determine if an item loaded on a given factor (Costello & Osborne, 2005). Items were not discarded on the basis of factor loadings as it is recommended to use a normative data sample to delete items using an EFA and the current study did not collect normative data (Spector, 1992).

Results from the item analysis, kurtosis, and item-total correlations among the adult sample are presented in Chapter VII.

Reliability. After I examined the MIRE items in both samples, a final measure was created. Using the final measure, internal consistency was examined using Cronbach's alpha. Cronbach's alpha was calculated for total score and the three subscale

scores. A Cronbach's alpha of 0.70 or higher is generally considered satisfactory, which indicates the measure is of sufficient length and that the items appear to be measuring similar content (Cronbach & Meehl, 1955; Spector, 1992; Cronbach & Shavelson, 2004). Test-retest reliability over two weeks was also examined as an indicator of temporal stability. The Intraclass Correlation Coefficient (ICC) between responses from the first administration to the second administration was calculated in order to examine test-retest reliability.

Validity. Convergent validity of the MIRE was examined by calculating Pearson product moment correlations between scores on the MIRE, the TPI, and the SBI. Positive and statistically significant correlation coefficients would provide evidence of convergent validity.

Concurrent validity of the MIRE was examined as follows: (a) by examining Pearson product moment correlations between scores on the MIRE and the CES-D, the PSI, the IBQ PAS, NEG and ORC subscales, and the ITSEA INT and EXT subscales; (b) by constructing regression models that examined the incremental validity of the MIRE in separately predicting (b1) depressive symptoms measured by the CES-D, while covarying TPI scores (b2) parenting stress measured by the self-reported PSI total stress scores, while covarying TPI scores, and (b3) child outcomes measured by the IBQ/ITSEA, while covarying TPI scores. Regression analyses were conducted in MPlus Version 7.2.

The results of the reliability and validity using the final measure in the adult sample are presented in Chapter IX.

Statistical Power. For tests that use bivariate correlation coefficients, power > .95 was available for a two tailed test (α=0.05) based on an N of 200 for a small-medium effect size ($r \geq .2$). For a multiple regression with two predictors, a two tailed test (α=0.05), and an overall squared R of 0.10, power > 0.95 was available to detect a coefficient that represents 5% unique explained variance.

CHAPTER VII.

RESULTS STUDY 2: Item Analysis

In this chapter, I will present the results from the item analyses performed among the MIRE in the adult sample. I will present the mean, kurtosis, and item-remainder coefficients of the items. The results from these analyses were used to inform decisions about item retention and item deletion. I then will present the results from the exploratory factor analysis on the items retained.

Item Analysis

The range of the items of the MIRE was 0 to 4. Following the recommendation from Allen and Yen (1979), I deleted items that had a mean below .25 or above 3.75. Table 7 presents the means for all items. Across the three subscales, 30 items (10 items from each subscale) were deleted for extreme means. All of the items had a mean above 3.75. The items deleted were:

- Playing with your child (items 5, 37, 69)
- Talking to your child (items 6, 38, 70)
- Smiling at your child (items 8, 40, 72)
- Holding your child (items 9, 41, 73)
- Looking at your child (items 14, 46, 78)
- Hugging your child (items 16, 48, 80)
- Ticking your child (items 17, 49, 81)
- Kissing your child (items 18, 50, 82)
- Laughing with your child (items 30, 62, 94)
- Singing to your child (items 31, 63, 95)

Kurtosis

Items that had kurtosis values >|3| were deleted. Table 7 presents the kurtosis for all items. Across the three subscales, 30 items (10 items from each subscale) were deleted for high kurtosis values. The items deleted were:

- Bathing your child (items 7, 39, 71)
- Reading to your child (items 10, 42, 74)
- Going outside with your child (items 12, 44, 76)
- Taking your child to public places (items 22, 54, 86)
- Making funny faces at your child (items 23, 55, 87)
- Taking pictures of your child (items 25, 57, 89)
- Taking videos of your child (items 26, 58, 90)
- Telling your child a story (items 27, 59, 91)
- Rocking your child (items 32, 64, 96)

Item-total Correlations

Items with item-remainder coefficients less than .30 were deleted to create a measure with high-internal consistency (Allen & Yen, 1979; Spector, 1992). Table 7 presents the item-remainder coefficients for all items. Six items (2 items from each subscale) were deleted because they had item-remainder coefficients less than .30. These items were:

- Listening to your child cry (items 4, 36, 68)
- Punishing your child (items 24, 56, 88)

Exploratory Factor Analysis (EFA)

An EFA on the remaining 33 items was carried out using principal components analysis with an oblique rotation. Following the recommendations of O'Connor (2000), a parallel analysis that created one thousand randomized permutations of the MIRE data was used to determine the number of factors that should be extracted. Table 8 shows the mean eigenvalues derived from the random permutations, the corresponding 95th percentile eigenvalues, and the actual eigenvalues from the original raw data. The eigenvalues from the raw data were retained as a factor if they were greater than the 95th percentile eigenvalues created from the randomized data. An inspection of Table 8 indicates there were three eigenvalues computed from the original raw data that are greater than the 95th percentile eigenvalues data.

Figure 2 presents the scree plot of the raw data, mean, and 95th percentile eigenvalues. According to parallel analysis, any factors that are above the intersection in the actual data and the 95th percentile line should be retained (O'Connor, 2000). In Figure 2, three factors are above the intersection, which is consistent with the three factors retained from the inspection of Table 8.

Table 9 presents the item loadings for each of the three factors. Although there are three factors, the items loadings were not consistent with the three subscales that were developed with the self-report measure. However, this is not uncommon for measure development and no items were deleted on the basis of factor loadings (Spector, 1992). Factor analysis is sensitive to the total number of items and adding and deleting a single item can have profound effects on the results; therefore, it is recommended to use a

normative data sample to delete items based on an EFA and the current study did not collect normative data (Spector, 1992).

Table 10 presents the final 33 items retained after item analyses.

CHAPTER VIII.

RESULTS: Reliability/Validity Study 1 Using Final Measure

Using the results of the item analyses for the two samples, described in the preceding chapters, I narrowed the self-report measure down to 33 items (11 items per subscale). In this chapter, I will present the results of the reliability and validity of the final 33-item measure in the adolescent sample.

Reliability

Internal consistency reliability was examined using Cronbach's alpha. Cronbach's alpha for the 33-item total measure was .92. Cronbach's alpha for the desire, pleasure, and savoring 11-item subscales was .80, .82 and, .85 respectively. Thus, internal consistency reliability was in the good to excellent range among adolescent mothers.

Test-retest reliability was examined using Intraclass Correlation Coefficients (ICC) between responses on the first administration and the second administration two weeks later. The test-retest estimates for MIRE desire subscale was ICC = .87 ($p < .01$), for MIRE pleasure subscale was ICC = .84 ($p < .01$), and for MIRE savoring subscale was ICC = .82 ($p < .01$). These ICCs indicate that test-retest reliability was acceptable between the first and second administration of MIRE separated by an interval of two weeks.

Validity

Convergent validity. Convergent validity was examined using Pearson product moment correlations between scores on the MIRE and scores on the TPI and the SBI, respectively. Significant and positive correlations would support convergent validity. Table 11 shows the means of, standard deviations of, and the intercorrelations between

the MIRE desire, pleasure, and savoring subscales, and the TPI desire and pleasure subscales, and the SBI savoring subscale. The MIRE desire subscale was positively but not significantly correlated with TPI desire subscale, $r = .30$, $p = .11$. The MIRE pleasure subscale negatively and not significantly correlated with TPI pleasure subscale, $r = -0.04$, $p = .83$. The MIRE savoring subscale was negatively and not significantly correlated with SBI savoring subscale, $r = -0.04$, $p = .84$. These correlations indicate mixed support for convergent validity. The non-significant correlations between the MIRE desire subscale and TPI desire subscale, the MIRE pleasure and TPI pleasure subscales, and MIRE savoring and SBI savoring subscales do not support convergent validity.

Concurrent validity. Concurrent validity was examined using Pearson product moment correlations between scores on the MIRE subscales, CES-D total scores, the PSI subscales, the IBQ subscales, and the ITSEA subscales. Significant and negative correlations would support concurrent validity except for associations between the MIRE subscales and the IBQ Positive Affectivity/Surgency (PAS) and the IBQ Orienting/Regulatory Capacity (ORC) subscales. For the IBQ PAS and ORC subscales, significant and positive correlations would support concurrent validity.

Associations with depressive symptoms. Table 11 shows the means of, standard deviations of, and the intercorrelations between the MIRE desire, pleasure, and savoring subscales, and the CES-D total scores. The MIRE desire subscale was significantly and negatively correlated with CES-D scores, $r = -.48$, $p = .01$. The MIRE pleasure subscale was significantly and negatively correlated with CES-D scores, $r = -.41$, $p = .02$. The MIRE savoring subscale was significantly and negatively correlated with CES-D scores,

r = -.36, p = .05. These significant and negative correlations provide support for concurrent validity for each subscale.

Associations with parenting stress. Table 11 shows the means of, standard deviations of, and the intercorrelations between the MIRE desire, pleasure, and savoring subscales, and the PSI subscales: Parental Distress (PD), Parent–Child Dysfunctional Interaction (PCDI), Difficult Child (DC) and Total Stress (TS). The MIRE desire subscale was significantly and negatively correlated with the PSI PD (r = -.35, p = .05) and PSI TS scores (r = -.44, p = .01). The MIRE desire subscale was nonsignificantly and negatively correlated with the PSI PCDI (r = -.30, p = .10) and PSI DC scores (r = -.29, p = .11). The MIRE pleasure subscale was nonsignificantly and negatively correlated with the PSI PD (r = -.32, p = .08), PSI PCDI (r = -.20, p = .29), and PSI DC (r = -.26, p = .16). The MIRE pleasure subscale was significantly and negatively correlated with the PSI TS (r = -.37, p = .04). The MIRE pleasure savoring was nonsignificantly and negatively correlated with the PSI PD (r = -.22, p = .24), PSI PCDI (r = -.15, p = .43), PSI DC (r = -.24, p = .19) and PSI TS (r = -.29, p = .12). For each MIRE subscale, the direction and magnitude of the correlation coefficients indicate small to moderate associations with the subscales of the Parenting Stress Index; however, additional evaluations in a larger sample will be necessary before drawing conclusions about concurrent validity.

Associations with child outcomes. Table 11 shows the means of, standard deviations of, and the intercorrelations between the MIRE desire, pleasure, and savoring subscales, and the IBQ subscales: Positive Affectivity/Surgency (PAS), Negative Emotionality (NEG) and Orienting/Regulatory Capacity (ORC). The IBQ measure was

given to mothers with children under 12 months old. Fourteen (45%) mothers had children under 12 months and completed the IBQ. Significant and positive correlations between MIRE subscales and the IBQ PAS and ORC subscales would support concurrent validity. The MIRE desire subscale was significantly and positively correlated with the IBQ PAS (r = .66, p = .01) and IBQ ORC scores (r = .73, p = .00). These significant positive correlations indicate preliminary support for concurrent validity for the MIRE desire subscale. Significant and negative correlations validity between the MIRE subscales and the IBQ NEG subscale would support concurrent validity. The MIRE desire subscale was nonsignificantly and positively correlated with the IBQ NEG subscale (r = .29, p = .33), which does not support concurrent validity for the MIRE desire subscale. The MIRE pleasure subscale was not significantly correlated with the IBQ subscales: IBQ PAS (r = .18, p = .56), IBQ ORC scores (r = .21, p = .50), and IBQ NEG (r = .37, p = .21). These correlations do not support concurrent validity for the MIRE pleasure subscale. The MIRE savoring subscale was not significantly correlated with the IBQ subscales: IBQ PAS (r = .06, p = .84), IBQ ORC scores (r = .06, p = .84), and IBQ NEG (r = .03, p = .92). These correlations do not provide evidence of concurrent validity for the MIRE savoring subscale.

Table 11 shows the means of, standard deviations of, and the intercorrelations between the MIRE desire, pleasure, and savoring subscales, and the ITSEA subscales: Externalizing (EXT) and Internalizing (INT). The ITSEA measure was given to mothers with children over 12 months old. Seventeen (55%) mothers had children over 12 months and completed the ITSEA. Significant and negative correlations between MIRE subscales and the ITSEA EXT and INT subscales would support concurrent validity. The

MIRE desire subscale was nonsignificantly and negatively correlated with the ITSEA EXT (r = -.37, p = .17) and ITSEA INT (r = -.33, p = .23). The MIRE pleasure subscale was nonsignificantly and negatively correlated with the ITSEA EXT (r = -.44, p = .09) and ITSEA INT (r = -.30, p = .25). For the MIRE desire and pleasure subscales, the direction and magnitude of the correlation coefficients indicate moderate associations with ITSEA subscales, but further evaluations with a larger sample will be needed before conclusions are drawn about concurrent validity. The MIRE savoring subscale was nonsignificantly and negatively correlated with the ITSEA EXT (r = -.25, p = .35) and ITSEA INT (r = -.11, p = .69), which does not provide support for concurrent validity of the MIRE savoring subscale.

CHAPTER IX.

RESULTS: Reliability/Validity Study 2 Using Final Measure

In this chapter, I will present the results of the reliability and validity of the final 33-item self-report measure in the adult sample (n=200). I also will present the results of regression models that examined the incremental validity of the MIRE and whether MIRE scores significantly predicted child outcomes.

Reliability

Cronbach's alpha for the 33-item total measure was .95. Cronbach's alpha for the desire, pleasure, and savoring 11-item subscales was .87, .86, and .89, respectively. Thus, internal consistency reliability was in the good to excellent range in the present sample of adult mothers.

Test-retest reliability was examined using Intraclass Correlation Coefficients (ICC) between responses on a first administration in person and a second administration by phone two weeks later. Only a small minority of mothers (10%) answered the phone and completed the second administration. In this subset of 20 mothers, the test-retest estimate for MIRE desire scores was ICC = .95 ($p < .01$), for MIRE pleasure scores was ICC = .92 ($p < .01$), and for MIRE savoring scores was ICC = .91 ($p < .01$). These ICCs indicate excellent test-retest reliability between the first and second administration of the MIRE over a two-week interval, although retention of participants for the second administration was low.

Validity

Convergent validity. Convergent validity was examined using Pearson product moment correlations between scores on the MIRE and the TPI and the SBI, respectively.

Significant and positive correlations would support convergent validity. Table 12 shows the means of, standard deviations of, and the intercorrelations between the MIRE desire, pleasure, and savoring subscales, and the TPI desire and pleasure subscales, and the SBI savoring subscale. The MIRE desire subscale was significantly and positively correlated with TPI desire subscale, $r = .29$, $p < .001$. The MIRE pleasure subscale was significantly and positively correlated with TPI pleasure subscale, $r = .27$, $p < .001$. The MIRE savoring subscale was positively but not significantly correlated with SBI savoring subscale, $r = .05$, $p = .53$. These correlations indicate mixed support for convergent validity. The significant and positive correlations between the MIRE desire subscale and TPI desire subscale and the MIRE pleasure subscale and TPI pleasure support convergent validity; however, the nonsignificant correlation between the MIRE savoring and SBI savoring subscale does not support convergent validity.

Concurrent validity. Concurrent validity was examined using Pearson product moment correlations between scores on the MIRE subscales and CES-D total scores, PSI subscales, IBQ subscales and ITSEA subscales. Significant and negative correlations would support concurrent validity except for associations between the MIRE subscales and the IBQ Positive Affectivity/Surgency (PAS) and the IBQ Orienting/Regulatory Capacity (ORC) subscales. For the IBQ PAS and ORC subscales, significant and positive correlations would support concurrent validity.

Associations with depressive symptoms. Table 12 shows the means of, standard deviations of, and the intercorrelations between the MIRE desire, pleasure, and savoring subscales, and the CES-D total scores. The MIRE desire subscale was significantly and negatively correlated with CES-D scores, $r = -.17$, $p = .02$. The MIRE pleasure subscale

was significantly and negatively correlated with CES-D scores, $r = -.20$, $p = .01$. The MIRE savoring subscale was significantly and negatively correlated with CES-D scores, $r = -.16$, $p = .04$. These significant and negative correlations indicate support for the concurrent validity for each MIRE subscale.

Associations with parenting stress. Table 12 shows the means of, standard deviations of, and the intercorrelations between the MIRE desire, pleasure, and savoring subscales, and the PSI subscales: Parental Distress (PD), Parent–Child Dysfunctional Interaction (PCDI), Difficult Child (DC) and Total Stress (TS). The MIRE desire subscale was significantly and negatively correlated with the PSI PD ($r = -.31$, $p < .01$), PSI PCDI ($r = -.18$, $p = .01$), PSI DC ($r = -.42$, $p < .01$), and PSI TS ($r = -.36$, $p < .01$). These significant negative correlations indicate support for concurrent validity for the MIRE desire subscale. The MIRE pleasure subscale was significantly and negatively correlated with the PSI PD ($r = -.36$, $p < .01$), PSI PCDI ($r = -.22$, $p = .02$), PSI DC ($r = -.39$, $p < .01$), and PSI TS ($r = -.28$, $p < .01$). These significant negative correlations indicate support for concurrent validity for the MIRE pleasure subscale. The MIRE savoring subscale was significantly and negatively correlated with the PSI PD ($r = -.24$, $p < .01$), PSI DC ($r = -.34$, $p < .01$) and PSI TS ($r = -.28$, $p < .01$). The MIRE savoring subscale was nonsignificantly and negatively correlated with the PSI PCDI ($r = -.13$, $p = .09$). These significant and negative correlations between the MIRE savoring subscale and PSI subscales (PD, DC and TS) and nonsignificant correlation between the MIRE savoring subscale and PSI PCDI subscale indicate mixed support for concurrent validity for the MIRE savoring subscale.

Associations with child outcomes. Table 12 shows the means of, standard deviations of, and the intercorrelations between the MIRE desire, pleasure, and savoring subscales, and the IBQ subscales: Positive Affectivity/Surgency (PAS), Negative Emotionality (NEG) and Orienting/Regulatory Capacity (ORC). The IBQ measure was given to mothers with children under 12 months old. One-hundred (50%) mothers had children under 12 months and completed the IBQ. Significant and positive correlations between MIRE subscales and the IBQ PAS and ORC subscales would support concurrent validity. The MIRE desire subscale was significantly and positively correlated with the IBQ PAS (r = .30, p = .03) and IBQ ORC scores (r = .38 p = .01). These significant positive correlations indicate preliminary support for concurrent validity for the MIRE desire subscale. Significant and negative correlations between the MIRE subscales and the IBQ NEG subscale would support concurrent validity. The MIRE desire subscale was nonsignificantly and negatively correlated with the IBQ NEG subscale (r = -.23, p = .09), which does not support concurrent validity for the MIRE desire subscale. The MIRE pleasure subscale was not significantly correlated with the IBQ PAS (r = .18, p = .22) and IBQ NEG (r = -.12, p = .40). These correlations do not support concurrent validity for the MIRE pleasure subscale. The MIRE pleasure subscale was significantly and positively correlated with the IBQ ORC (r = .37, p = .01), which supports concurrent validity for the MIRE pleasure subscale. The MIRE savoring subscale was not significantly correlated with the IBQ NEG (r = -.12, p = .41), and IBQ ORC (r = .22, p = .12). The MIRE savoring subscale was significantly and positively correlated with the IBQ PAS (r = .28, p = .05). These correlations provide mixed support for concurrent validity of the MIRE savoring subscale.

Table 12 shows the means of, standard deviations of, and the intercorrelations between the MIRE desire, pleasure, and savoring subscales, and the ITSEA subscales: Externalizing (EXT) and Internalizing (INT). The ITSEA measure was given to mothers with children over 12 months old. One-hundred (50%) mothers had children over 12 months and completed the ITSEA. Significant and negative correlations between MIRE subscales and the ITSEA EXT and INT subscales would support concurrent validity. The MIRE desire subscale was significantly and negatively correlated with the ITSEA EXT (r = -.37, p = .06) and nonsignificantly and negatively correlated with the ITSEA INT (r = -.21, p = .09). The MIRE pleasure subscale was significantly and negatively correlated with the ITSEA EXT (r = -.26, p = .03) and nonsignificantly and negatively correlated with the ITSEA INT (r = -.20, p = .10). The MIRE savoring subscale was significantly and negatively correlated with the ITSEA EXT (r = -.27, p = .03) and nonsignificantly and negatively correlated with the ITSEA INT (r = -.18, p = .16). These significant and negative correlations between all three MIRE subscales and the ITSEA EXT subscale indicate support for concurrent validity; however, the nonsignificant correlations between ITSEA INT subscale and the MIRE subscales do not provide support for concurrent validity.

Incremental validity. To examine the incremental validity of the MIRE, seven separate hierarchical regression analyses were constructed using the MIRE as the predictor variable, while covarying TPI Scores, age and gender. The seven hierarchical regression analyses used the following outcome variables as the dependent variable, respectively: CES-D total score, PSI Total Stress score, the three IBQ subscales (PAS, NEG, ORC), and the two ITSEA subscales (EXT, INT).

In the first hierarchical regression analysis, the CES-D total score was placed as the dependent variable and age, sex, and average score of TPI subscales were entered as predictors in step 1 (see Table 13). In step 2, the CES-D total score was placed as the dependent variable and age, sex, and average score of the MIRE subscales and average score of TPI subscales were entered as predictors (see Table 13). The results indicated that TPI scores, but not MIRE scores were significantly associated with the CES-D total score. These results do not support incremental validity for the MIRE in predicting depressive symptoms.

In the second hierarchical regression analysis, the PSI Total Stress was placed as the dependent variable in both steps (see Table 14). In step 1, age, sex, and average TPI scores were entered as predictors. In step 2, age, sex, average MIRE scores and average TPI scores were entered as predictors. The results indicated that MIRE scores and TPI scores both were significantly associated with the PSI Total Stress. These results support incremental validity for the MIRE in predicting parenting stress.

In the third hierarchical regression analysis, the IBQ PAS subscale score was placed as the dependent variable and age, sex, and average TPI scores were entered as predictors in step 1 (see Table 15). In step 2, the IBQ PAS subscale score was placed as the dependent variable and age, sex, average MIRE scores, and average TPI scores were entered as predictors (see Table 15). The results indicated that age and MIRE scores were significantly associated with IBQ PAS scores. These results support incremental validity for the MIRE in predicting infant positive affectivity and surgency scores.

In the fourth hierarchical regression analysis, the IBQ NEG subscale score was placed as the dependent variable and age, sex, and average TPI scores were entered as

predictors in step 1 (see Table 16). In step 2, the IBQ NEG subscale score was placed as the dependent variable and age, sex, average MIRE scores, and average TPI scores were entered as predictors (see Table 16). The results indicated that age was significantly associated with IBQ NEG scores and do not support incremental validity for the MIRE in predicating infant negative emotionality.

In the fifth hierarchical regression analysis, the IBQ ORC subscale score was placed as the dependent variable and age, sex, and average TPI scores were entered as predictors in step 1(see Table 17). In step 2, the IBQ ORC subscale score was placed as the dependent variable and age, sex, average MIRE scores, and average TPI scores were entered as predictors (see Table 17). The results indicated that MIRE scores and TPI scores were significantly associated with IBQ ORC scores, which supports incremental validity for the MIRE in predicting infants' regulatory capacity.

In the sixth hierarchical regression analysis, the ITSEA EXT subscale was placed as the dependent variable and age, sex, and average TPI scores were entered as predictors in step 1 (see Table 18). In step 2, the ITSEA EXT subscale was placed as the dependent variable and age, sex, average MIRE scores, and average TPI scores were entered as predictors (see Table 18). The results indicated that MIRE scores were nonsignificantly (p = .08) associated with ITSEA EXT scores at a trend level. Given the sample size for this measure was smaller (n=100) and the results are approaching significance, future research is needed to draw conclusions on incremental validity for the MIRE in predicating infants' externalizing behavior scores.

In the final hierarchical regression analysis, the ITSEA INT subscale was placed as the dependent variable and age, sex, and average TPI scores were entered as predictors

in step 1 (see Table 19). In step 2, the ITSEA INT subscale was placed as the dependent variable and age, sex, average MIRE scores, and average TPI scores were entered as predictors (see Table 19). The results indicated that MIRE scores were not significantly associated with ITSEA INT scores and do not support incremental validity for the MIRE in predicating infants' internalizing behavior scores.

CHAPTER X.

DISCUSSION

The primary purpose of the current dissertation was to develop and validate a measure of maternal reward responsivity relevant to mothers' interactions with their infants. A secondary purpose was to gain insight into the role of impaired reward responsivity among mothers to inform models of risk transmission and interventions to prevent the transmission of risk from depressed mothers to their offspring. In this chapter, I summarize the results of the development and validation of the measure of maternal reward responsivity. I then discuss the role of impaired reward responsivity and its relationship with maternal depression and negative child outcomes. I conclude with a discussion of limitations to the current dissertation and future research directions.

Summary of Item Development

In this dissertation, I introduced the concept of reward responsivity in parenting and described the development of the Mother Inventory of Reward Experience (MIRE), a scale designed to assess the degree to which a mother experiences desire for, pleasure in, and savoring of her interactions with her infant. The results from the two studies in this dissertation provide initial evidence that the MIRE is a reliable and valid measure that provides a novel contribution to the reward responsivity and maternal depression literatures.

An initial 33-item pool was developed guided by the theory of reward responsivity among depressed individuals. Three subscales were developed for each phase of reward responsivity: desire, pleasure and savoring. The item stem was the same across subscales; therefore, 33 item stems resulted in a total of 99 items. Modifications

were made on the item pool based on reviews from experts in the field and feedback from adolescent mothers who were asked to critique the measure. After modifications, a 105-item scale resulted and was piloted among a sample of adolescent mothers in study 1.

Study 1 Results. The item mean, kurtosis, and item-remainder coefficients were used to examine item performance. Nine items were removed for poor performance, which resulted in 96 items that were tested in a larger adult sample in Study 2.

Study 2 **Results.** The item mean, kurtosis, and item-remainder coefficients were used to examine item performance. Sixty-three items were removed for poor performance, which resulted in 33 items (11 per subscale) that were used to create the final measure.

An EFA was performed to examine the factor structure of the MIRE. Although three factors were extracted, the item loadings were not consistent with the three subscales that were developed for the MIRE. It was difficult to identify patterns of item loadings on each factor as the majority of items loaded onto the first factor. However, no items were deleted based on factor loadings, as it is not uncommon to have inconsistent results from factor analysis in measure development studies (Spector, 1992). It is recommended to use a normative data sample to delete items based on an EFA (Spector, 1992); therefore, future studies should examine an EFA of MIRE items on a larger normative sample.

Summary of Reliability and Validity

Study 1 Results. Given the small sample size (n=31) in study 1, statistical significance should not be the primary criteria for drawing conclusions about the MIRE

measure. Instead, the focus of study 1 reliability and validity analyses were to inform future investigations of reward responsivity in adolescent mothers.

Reliability outcomes. In terms of reliability, the coefficient alphas for the total scale and the three subscales were good to excellent. Findings also provided evidence to support test-retest reliability over a two-week interval. These findings provide preliminary evidence to support the reliability of MIRE in adolescent mothers.

Convergent validity outcomes. The findings for convergent validity were mixed. In support of convergent validity, the MIRE desire subscale was moderately correlated at a trend level with a measure of desire related to general reward responsivity. Correlations between the MIRE pleasure and savoring subscales with measures of constructs related to pleasure and savoring were negative and not significant. Future research with a larger sample size will be needed to further examine convergent validity in adolescent mothers.

Concurrent validity outcomes. In support of concurrent validity, each MIRE subscale was significantly and negatively correlated with depressive symptoms. The strength of the relationship was in the moderate range. These findings are consistent with the hypothesis that low levels of reward responsivity in parenting would be associated with higher levels of depressive symptoms. These findings are also consistent with literature indicating depressed mothers experience difficulties in motivation to engage with their infants and display low levels of positive emotions during interactions with their infants (Lovejoy et al., 2000; Field et al., 2007). Due to the correlational and cross-sectional study design, no conclusions can be drawn with regard to the temporal direction

of the associations between reward responsivity in parenting and maternal depressive symptoms.

Each MIRE subscale was negatively correlated with a measure of parental stress that included subscales with constructs of parent-child dysfunctional interactions, child behavior, and parental distress. All of the correlations were either significant or nonsignificant with a trend towards significance in the small to moderate range. Given that the correlations approached significance, further evaluations in a larger sample will be necessary before drawing conclusions about concurrent validity via associations with parental stress in adolescent mothers.

Also in support of concurrent validity, the MIRE desire subscale was positively and significantly correlated with infant positive affectivity and regulatory capacity. These correlations were large with coefficients greater than .5. These results support the hypothesis that maternal desire is associated with positive behaviors in infants, according to maternal ratings of infant behaviors. However, results from correlations between the MIRE desire subscale and infant negative emotionality did not support concurrent validity. In addition, the associations between MIRE pleasure and savoring subscales and infant outcomes did not support concurrent validity. Only mothers who had a child under 12 months completed these infant measures; therefore, the sample size was smaller than the overall sample (n=14). The very small sample with available data in this age range resulted in low statistical power; conclusions about the absence of an association should be made with this limitation in mind.

Mothers with children over 12 months (n=17) completed a measure of infant externalizing and internalizing behavior problems. The MIRE desire and pleasure

subscales were nonsignificantly and negatively correlated with infant externalizing and internalizing symptoms at a trend level, and correlation coefficients were in the moderate range. Although results indicate a moderate size association approaching statistical significance, future research is needed to draw conclusions about whether maternal desire and pleasure from parent-child interactions are associated with increased infant externalizing and internalizing symptoms in adolescent mothers. The MIRE savoring subscale was not significantly correlated with infant behavior and there was not a trend toward significance. The sample size (n=17) may have contributed to these findings and future research with a larger sample size should further examine this relationship.

Study 2 Results.

Reliability outcomes. In terms of reliability, the coefficient alphas for the total scale and the three subscales were good to excellent. Findings also provided evidence to support test-retest reliability over a two-week interval in a subset of the sample. These findings provide evidence to support the reliability of MIRE in adult mothers.

Convergent validity outcomes. The findings for convergent validity were mixed. In support of convergent validity, the MIRE desire subscale was significantly correlated with a measure of desire related to general reward responsivity, with a coefficient in the small range. The correlation between the MIRE pleasure and a measure of pleasure related to general reward responsivity was significant with a coefficient in the small range. This finding supports convergent validity for the MIRE pleasure subscale. The MIRE savoring subscale was not significantly associated with a measure of savoring, which does not support convergent validity. Future research should examine the MIRE

savoring subscale with other measures of savoring to determine if other measures support convergent validity.

Concurrent validity outcomes. In support of concurrent validity, each MIRE subscale was significantly and negatively correlated with depressive symptoms. The strength of the relationships were in the small to moderate range. These findings are consistent with the hypothesis that lower levels of reward responsivity in parenting would be associated with higher levels of depressive symptoms. These findings are also consistent with the findings from study 1 and with literature indicating depressed mothers experience difficulties in motivation to engage with their infants and display low levels of positive emotions during interactions with their infants (Lovejoy et al., 2000; Field et al., 2007). Due to the correlational and cross-sectional study design, no conclusions can be drawn with regard to the directionality of the associations between reward responsivity in parenting and maternal depressive symptoms.

In further support of concurrent validity, each MIRE subscale was significantly correlated with a measure of parental stress that included subscales with constructs of parent-child dysfunctional interactions, child behavior, and parental distress. All of the significant correlations were in the small to moderate range. These results thus support the hypothesis that low levels of reward responsivity in parenting would be associated with higher levels of parental stress, parental dissatisfaction in interactions with their child, and the degree to which parents find their child difficult. These results are consistent with past research that depressed mothers show fewer positive behaviors (Field et al., 1988; Field et al., 2007) and more impatience and hostility during interactions with their infants (Lovejoy et al., 2000) compared to non-depressed mothers. The correlation

between the MIRE savoring subscale and the parent-child interaction subscale was not significant; however, the MIRE savoring subscale was significantly associated with the other subscales of parenting stress. Savoring may not be related to parent-child dysfunctional interaction or the MIRE savoring subscale may need modifications.

In additional support of concurrent validity, the MIRE desire subscale was positively and significantly correlated with infant positive affectivity and regulatory capacity. These correlations were in the moderate to large range. These results are consistent with the results of Study 1 and support the hypothesis that maternal desire is associated with positive behaviors in infants, according to maternal ratings of infant behaviors. The MIRE pleasure subscale was positively and significantly correlated with infant regulatory capacity, but not positive affectivity. The MIRE savoring subscale was significantly correlated with infant positive affectivity, but not regulatory capacity. These correlations were in the small to moderate range. These results suggest that maternal pleasure is associated with infant positive behaviors and that maternal savoring is associated with infant regulatory capacity, according to maternal ratings of infant behaviors. Results from correlations between the MIRE desire, pleasure, and savoring subscale and infant negative emotionality did not support concurrent validity. These nonsignificant correlations may be due to poor performance of the MIRE measure or to a lack of relationship between maternal reward and the infant negative emotionality. Future research needs to explore this relationship further.

The MIRE desire, pleasure, and savoring subscales were significantly and negatively correlated with infant externalizing symptoms. The correlation coefficients were in the small to moderate range. These findings support concurrent validity and are

consistent with the hypothesis that diminished maternal desire and pleasure from parent-child interactions are associated with increased infant externalizing symptoms. The MIRE desire, pleasure and savoring subscales were not significantly correlated with infant internalizing symptoms. These findings do not support concurrent validity. Poor performance of the MIRE measure or a lack of relationship between maternal reward and infant internalizing symptoms may contribute to the nonsignificant correlations.

Incremental validity outcomes. The findings for incremental validity for the MIRE measure were mixed. Incremental validity was evaluated via predictions of the MIRE measure while covarying scores from a general measure of reward responsivity on seven distinct outcome measures. Incremental validity was supported in three of the seven regression models. In support of incremental validity, the MIRE measure incrementally predicted unique variance in a measure of parenting stress over and above variance predicted by a general measure of reward responsivity. The finding supports the hypothesis that low levels of reward responsivity in parenting would predict higher levels of parental stress and is consistent with literature indicating that elevated parental stress is associated with negative parenting behavior and less responsiveness in parent-child interactions (Deater-Deckard & Scarr, 1996; Pinderhughes, Dodge, Bates, Pettit, & Zelli, 2000).

In further support of incremental validity, the MIRE significantly predicted infant positive affectivity and regulatory capacity. These findings support the hypothesis that high levels of reward responsivity in parenting would predict higher levels of infant positive affect and regulatory capacity. These results are consistent with past literature that suggests offspring of depressed mothers have poor-self regulatory abilities compared

to offspring of mothers who were not depressed (Field et al., 1988; Cohn et al., 1990; Coyl et al., 2002; Forman et al., 2007). The MIRE predicted externalizing behavior at a trend level significance. Although results are approaching statistical significance, future research is needed before drawing conclusions about the incremental validity of the MIRE in predicting externalizing behaviors.

The MIRE did not significantly predict depressive symptoms, infant's negative emotionality or internalizing symptoms. These findings do not support incremental validity and are not consistent with the hypotheses that low levels of reward responsivity in parenting would predict higher levels of depressive symptoms, infant negative emotionality and internalizing behavior problems in infants. The general measure of reward responsivity was associated with depressive symptoms; therefore, the relationship between maternal reward responsivity and depression may be explained by general reward responsivity. Future research is needed to further explore the relationship between maternal reward responsivity and infant negative affect and internalizing symptoms.

Implications

Implications for reward responsivity literature. The majority of research on reward responsivity has examined the construct of reward responsivity via performance-based reward tasks or fMRI paradigms. Prior to using resource intensive neuroscience methods in mothers, the current study sought to first gather behavioral data to establish the presence of maternal reward responsivity deficits. Results from the current study provide evidence for the construct validity of maternal reward responsivity among

mothers via significant negative associations between the MIRE subscales and depressive symptoms, parenting stress, and infant behavior problems.

In the current study, maternal reward responsivity was divided into an anticipatory phase (desire), a consummatory phase (pleasure; Henriques & Davidson, 2000; Pizzagalli, et al., 2008; Sherdell et al., 2012) and a savoring phase (past or prolonging the present; Bryant, 1989). Findings from exploratory factor analyses in the current study did not align with the three subscale factors. This suggests that maternal reward responsivity may not consist of three separate phases Future research is needed to draw conclusions on the specific subscales; however, findings from the current factor analysis could be interpreted as providing support for a unitary construct of reward responsivity given that the majority of items loaded on the first factor and the majority of variance among items was explained by this factor.

Previous research on the three phases of reward responsivity has shown that depressed individuals significantly differ in the anticipatory and savoring phase relative to non-depressed individuals (Carver & Johnson, 2009; Sherdell et al., 2012); however, depressed individuals do not significantly differ in the consummatory phase relative to non-depressed individuals (Sherdell et al., 2012). The results from the current study align with previous results that lower levels of anticipatory and savoring maternal reward were associated with higher levels of depressive symptoms; however, results also showed that lower levels of maternal consummatory pleasure was associated with higher levels of depressive symptoms.

Practical implications. In future research, researchers should use the MIRE total scores rather than subscale scores. Total scores outperformed subscales scores in terms

of reliability and were similar in terms of validity. In study 1 and 2, Cronbach's alpha was excellent for the total score (αs=.92, .95 respectively) and good for the subscale scores (αs ranging from .80-.89). Total scores performed similar in terms of validity. Results for concurrent and convergent validity using subscale scores were similar to results from incremental validity using total scores. Correlations between subscales were large (*rs* ranging from .70-.83), which suggests there is significant overlap between subscales and they may be redundant. There were also no instances of differential associations between all three subscales. Lastly, the lack of support for the three subscales from the exploratory factor analysis suggests total scores should be used.

Future research will need to evaluate the utility of the MIRE in clinical settings. A tool for assessing maternal reward responsivity could help clinicians evaluate the degree to which a mother experiences desire, pleasure and savoring from interactions with her infant. With the MIRE, a clinician could evaluate the efficacy of interventions aimed at increasing pleasurable experiences during parent-child interactions. The MIRE would enable clinicians to examine the changes in maternal reward responsivity pre and post treatment.

Limitations

This dissertation study's findings should be interpreted in light of its limitations. The small sample size in Study 1 did not allow for adequate statistical power for hypothesis testing and further evaluation is necessary before drawing conclusions about maternal reward responsivity in adolescence. In addition, the sample in Study 2 was drawn from a pediatric primary care clinic that serves mostly Hispanic women; it is unclear the extent to which these findings would generalize to non-Hispanic mothers.

In additions to limitations within the samples, no conclusions about the directionality of the associations can be drawn between reward responsivity in parenting and maternal depressive symptoms due to the correlational and cross-sectional study design. Lower levels of maternal reward responsivity could increase depressive symptoms, the reverse could be true (i.e. increased depressive symptoms could lower maternal reward responsivity), or the association may be bidirectional.

The distinctions between the desire, pleasure, and savoring subscales of reward responsivity received mixed support. Support for the convergent validity of the MIRE savoring subscale was not found. The MIRE item pool tested in both studies was 105 items and the savoring subscale was last. There may be an element of participant fatigue that contributed to the poor performance of the savoring subscale. Future research should examine the three subscales with random assignment of subscale order (i.e., counterbalancing subscales) across participants.

The final two limitations are assessment-based limitations. The first assessment-based limitation was the sole reliance on psychosocial rating scales for all of the study variables. Future studies should consider using a parent-child interaction task to examine the MIRE's ability to predict parenting behavior according to an observational task. For example, the Dyadic Parent-Child Interaction Coding System (DPICS; Eyberg, Nelson, Duke, & Boggs, 2005) could be used to behaviorally code the quality of parent-child dyadic interactions. Associations between reward responsivity in parenting and positive maternal behaviors coded from the DPICS could be used to examine concurrent validity and to demonstrate potential mediating effect of reward responisvity in mothers between depression and parenting behaviors. Future studies should also consider using a

performance-based reward task to measure convergent validity between the MIRE and performance-based task. For example, the brief computer-administered performance task developed by Pizzagalli, Jahn, and O'Shea (2005) could be used to measure participants' ability to modify their choices as a function of differential reward.

The second assessment-based limitation is the absence of diagnostic data on maternal depression. The absence of this data prevented the identification of optimal cut points on which to determine the level of reward responsivity that optimally distinguishes depressed mothers from non-depressed mothers.

Future Directions

Despite these limitations, this dissertation project provides preliminary empirical support for a novel measure of reward responsivity in parenting. This dissertation project also points toward several directions for future research. As will be elaborated in the following paragraphs, two future directions for research based on the current findings are: (1) continuing to examine the performance of MIRE and (2) further understanding the role of maternal reward responsivity among depressed mothers.

To further examine the performance of MIRE among adolescent mothers, a large sample of adolescent mothers should be recruited and psychometric properties should be examined. In addition to a large sample of adolescent mothers, a larger sample of adult mothers from diverse geographic locations should be recruited to collect normative data. With a larger sample, item response theory (IRT) can be used to further evaluate the properties of the scale. Although classical test theory (CTT) and IRT are comparable (Fan, 1998; Lin, 2008), CTT is sample dependent and results are specific to the sample from which they are derived whereas IRT models the probabilistic distribution based on

theory and is applicable to the population (Tractenberg, 2010). Results from future IRT analyses would have greater implications for the utility and generalizability of the MIRE measure. Additionally, with a larger sample size, future research should examine the factor structure of the MIRE to determine whether there is empirical justification for retaining three subscales.

Future research should also examine reward responsivity as a potential mediator of the association between maternal depression and suboptimal parenting behaviors. Maternal depression is associated with offspring behavior problems from infancy through adolescence (O'Hara 2009; Bagner et al., 2010; Murray et al., 2011). There is growing evidence that suboptimal parenting behaviors, specifically parenting behaviors that occur during mother-infant interactions, mediate the negative impact of maternal depression on offspring behavior outcomes (Goodman & Brumley, 1990; Bifulco et al., 2002; Coyl et al., 2002). Given the mediating role of parenting behaviors between maternal depression and offspring negative outcomes, intervening to improve parenting behaviors among depressed mothers represents a potentially promising route to reduce the risk of negative offspring outcomes.

I propose maternal reward responsivity as a potential mediator of the association between maternal depression and parenting behaviors. However, in the absence of a measure of maternal reward responsivity, it is impossible to test my proposed mediation model. Given that a measure of maternal reward responsivity did not exist, the purpose of my dissertation study was to develop a reliable and valid measure of maternal reward responsivity. With that accomplished, future research can use the MIRE to examine maternal reward responsivity as a potential mediator of the association between maternal

depression and parenting behaviors. Understanding the role of maternal reward responsivity deficits and how they influence parenting behaviors among depressed mothers could inform models of risk transmission of depression and potentially identify a target for interventions to improve parenting behaviors among depressed mothers.

Conclusions

The current dissertation sought to develop a psychometrically sound measure of maternal reward responsivity relevant to mothers' interactions with their infants. The results provide evidence that the MIRE is a valid and reliable measure of maternal responsivity. Convergent validity of the MIRE subscales was supported via significant associations with a measure of general reward responsivity and concurrent validity was supported via significant associations with measures of depressive symptoms, parenting stress and child behavior. Incremental validity of the MIRE over general measures of reward responsivity was supported via significant predictions of parenting stress, infant positive affectivity, and infant regulatory capacity. The evidence for the reliability and validity of the MIRE provides an impetus for future research aimed at understanding the role of maternal reward responsivity, maternal depression, and parenting behaviors.

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APPENDICES

Table 1

Demographic Information on Study 1 Participants

	N	%	M	SD
Mother age (years)	--	--	16.97	1.22
Child age (months)	--	--	15.48	10.98
Child gender (male)	9	29	--	--
Child birth weight	--	--	6.35	1.11
Mother's ethnicity				
Hispanic	19	61.3	--	--
Non-Hispanic	12	38.7	--	--
Mother's race				
White	17	54.8	--	--
African-American	12	38.7	--	--
Bi-racial	2	6.5	--	--
Mother's marital status				
Single	14	45.2	--	--
In a relationship	17	54.8	--	--
Mother's current grade				
Sixth	1	3.2	--	--
Eighth	2	6.5	--	--
Ninth	4	12.9	--	--
Tenth	9	29	--	--
Eleventh	9	29	--	--
Twelfth	6	19.4	--	--
Mother's GPA	--	--	2.68	0.36
Mother's eligibility for free/reduced lunch (yes)	30	96.8	--	--
Mother's counseling or therapy history				
Never	17	54.8	--	--
In past	10	32.3	--	--
Currently	4	12.9	--	--

Note. M= mean; SD= standard deviation.

Table 2

Demographic Information on Study 2 Participants

	N	%	M	SD
Mother age (years)	--	--	28.45	5.50
Child age (months)	--	--	14.82	11.24
Child gender (male)	102	51	--	--
Child birth weight	--	--	6.95	1.73
Mother's ethnicity				
Hispanic	143	71.5	--	--
Non-Hispanic	57	28.5	--	--
Mother's race				
White	169	86.7	--	--
African-American	19	9.7	--	--
Asian	4	2.1	--	--
Native American	2	1.0	--	--
Bi-racial	1	0.5	--	--
Mother's marital status				
Married	98	50.5	--	--
Divorced/Separated	6	3.1	--	--
Single	44	22.7	--	--
In a relationship	46	23.7	--	--
Mother's education				
Did not complete high school	16	8.2	--	--
High school graduate	37	19.1	--	--
Some college or technical school	61	31.4	--	--
College graduate	49	25.3	--	--
Graduate/Professional Degree	31	16.0	--	--
Income ($)	--	--	3962.51	3128.95
Mother's counseling or therapy history				
Never	155	82.9	--	--
In past	20	10.7	--	--
Currently	12	6.4	--	--

Note. M= mean; SD= standard deviation.

Table 3

Original MIRE Item Pool

Instructions: The following questions ask you about your feelings and behaviors regarding parenting. Please read the instructions above each set of questions because each section has different directions.

Below is a list of experiences. Consider how you **USUALLY** feel. For each item, please indicate **how strongly you usually want to do** the following experiences. Please make your responses based only on your **desire** to experience these situations, regardless of how often you want to do them.

	No Desire	**Mild Desire**	**Moderate Desire**	**Great Desire**	**Extreme Desire**
1.Feeding your child					
2. Putting your child to bed					
3. Getting your child to stop crying					
4. Listening to your child cry					
5. Playing with your child					
6. Talking to your child					
7. Bathing your child					
8. Smiling at your child					
9. Holding your child					
10. Reading with your child					
11. Getting up early in the morning with your child					
12. Touching your child					
13. Speaking to your child					

14. Go outside with your child					
15. Imitating your child					
16. Looking at your child					
17. Washing your child's clothes					
18. Listening to your child scream					
19. Hugging your child					
20. Tickling your child					
21. Kissing your child					
22. Getting up in the night with your child					
23. Taking your child for a walk					
24. Changing your child's diaper					
25. Cleaning your child					
26. Massaging your child					
27. Taking your child to public places					
28. Making funny faces at your child					
29. Punishing your child					
30. Taking pictures of your child					
31. Taking videos of your child					
32. Telling your child a story					
33. Bouncing your child					

Now, for each item, please indicate **how much pleasure, happiness, or enjoyment you *usually* feel in the moment while doing** that type of experience. Check the box that best describes your response.

	No Pleasure	Mild Pleasure	Moderate Pleasure	Great Pleasure	Extreme Pleasure
34. Feeding your child					
35. Putting your child to bed					
36. Getting your child to stop crying					
37. Listening to your child cry					
38. Playing with your child					
39. Talking to your child					
40. Bathing your child					
41. Smiling at your child					
42. Holding your child					
43. Reading with your child					
44. Getting up early in the morning with your child					
45. Touching your child					
46. Speaking to your child					
47. Go outside with your child					
48. Imitating your child					
49. Looking at your child					
50. Washing your child's clothes					
51. Listening to your child scream					
52. Hugging your child					
53. Tickling your child					
54. Kissing your child					

55. Getting up in the night with your child					
56. Taking your child for a walk					
57. Changing your child's diaper					
58. Cleaning your child					
59. Massaging your child					
60. Taking your child to public places					
61. Making funny faces at your child					
62. Punishing your child					
63. Taking pictures of your child					
64. Taking videos of your child					
65. Telling your child a story					
66. Bouncing your child					

Now, for each item, indicate **how much pleasure, happiness, or enjoyment, you usually feel when remembering that experience in the past**. Please make your responses based only on how you feel when you **remember** your experience in these situations.

	No Pleasure	**Mild Pleasure**	**Moderate Pleasure**	**Great Pleasure**	**Extreme Pleasure**
67. Feeding your child					
68. Putting your child to bed					
69. Getting your child to stop crying					
70. Listening to your child cry					
71. Playing with your chi					
72. Talking to your child					

73. Bathing your child					
74. Smiling at your child					
75. Holding your child					
76. Reading with your child					
77. Getting up early in the morning with your child					
78. Touching your child					
79. Speaking to your child					
80. Go outside with your child					
81. Imitating your child					
82. Looking at your child					
83. Washing your child's clothes					
84. Listening to your child scream					
85. Hugging your child					
86. Tickling your child					
87. Kissing your child					
88. Getting up in the night with your child					
89. Taking your child for a walk					
90. Changing your child's diaper					
91. Cleaning your child					
92. Massaging your child					
93. Taking your child to public places					
94. Making funny faces					

95. Punishing your child					
96. Taking pictures of your child					
97. Taking videos of your child					
98. Telling your child a story					
99. Bouncing your child					

Table 4

Item Pool: Post Expert Reviewers Modifications

Anticipatory Scale					
	No Desire	**Mild Desire**	**Moderate Desire**	**Great Desire**	**Extreme Desire**
1.Feeding your child					
2. Putting your child to bed					
3. Getting your child to stop crying					
4. Listening to your child cry					
5. Playing with your child					
6. Talking to your child					
7. Bathing your child					
8. Smiling at your child					
9. Holding your child					
10. Reading to your child					
11. Getting up early in the morning with your child					
12. Touching your child					
13. Speaking to your child					
14. Going outside with your child					
15. Imitating your child					
16. Looking at your child					
17. Washing your child's clothes					
18. Listening to your child scream					

19. Hugging your child					
20. Tickling your child					
21. Kissing your child					
22. Getting up in the night with your child					
23. Taking your child for a walk					
24. Changing your child's diaper					
25. Cleaning your child					
26. Massaging your child					
27. Taking your child to public places					
28. Making funny faces at your child					
29. Punishing your child					
30. Taking pictures of your child					
31. Taking videos of your child					
32. Telling your child a story					
33. Dressing your child					
34. Spending time your child					
35. Cleaning up your child's mess					
36. Laughing with your child					
37. Singing to your child					
38. Cuddling your child					
39. Sacrificing your time for your child					
40. Rocking your child					

41. Laying down with your child					

Consummatory Scale					
	No Pleasure	**Mild Pleasure**	**Moderate Pleasure**	**Great Pleasure**	**Extreme Pleasure**
42. Feeding your child					
43. Putting your child to bed					
44. Getting your child to stop crying					
45. Listening to your child cry					
46. Playing with your child					
47. Talking to your child					
48. Bathing your child					
49. Smiling at your child					
50. Holding your child					
51. Reading to your child					
52. Getting up early in the morning with your child					
53. Touching your child					
54. Speaking to your child					
55. Going outside with your child					
56. Imitating your child					
57. Looking at your child					
58. Washing your child's clothes					
59. Listening to your child scream					

60. Hugging your child					
61. Tickling your child					
62. Kissing your child					
63. Getting up in the night with your child					
64. Taking your child for a walk					
65. Changing your child's diaper					
66. Cleaning your child					
67. Massaging your child					
68. Taking your child to public places					
69. Making funny faces at your child					
70. Punishing your child					
71. Taking pictures of your child					
72. Taking videos of your child					
73. Telling your child a story					
74. Dressing your child					
75. Spending time your child					
76. Cleaning up your child's mess					
77. Laughing with your child					
78. Singing to your child					
79. Cuddling your child					
80. Sacrificing your time for your child					
81. Rocking your child					

82. Laying down with your child					

Savoring Scale					
	No Pleasure	**Mild Pleasure**	**Moderate Pleasure**	**Great Pleasure**	**Extreme Pleasure**
83. Feeding your child					
84. Putting your child to bed					
85. Getting your child to stop crying					
86. Listening to your child cry					
87. Playing with your child					
88. Talking to your child					
89. Bathing your child					
90. Smiling at your child					
91. Holding your child					
92. Reading to your child					
93. Getting up early in the morning with your child					
94. Touching your child					
95. Speaking to your child					
96. Going outside with your child					
97. Imitating your child					
98. Looking at your child					
99. Washing your child's clothes					
100. Listening to your child scream					

101. Hugging your child					
102. Tickling your child					
103. Kissing your child					
104. Getting up in the night with your child					
105. Taking your child for a walk					
106. Changing your child's diaper					
107. Cleaning your child					
108. Massaging your child					
109. Taking your child to public places					
110. Making funny faces					
111. Punishing your child					
112. Taking pictures of your child					
113. Taking videos of your child					
114. Telling your child a story					
115. Dressing your child					
116. Spending time your child					
117. Cleaning up your child's mess					
118. Laughing with your child					
119. Singing to your child					
120. Cuddling your child					
121. Sacrificing your time for your child					
122. Rocking your child					

123. Laying down with your child					

Table 5

Item Pool: Post Study 1 Modifications

Anticipatory Scale					
	No Desire	**Mild Desire**	**Moderate Desire**	**Great Desire**	**Extreme Desire**
1.Feeding your child					
2. Putting your child to bed					
3. Getting your child to stop crying					
4. Listening to your child cry					
5. Playing with your child					
6. Talking to your child					
7. Bathing your child					
8. Smiling at your child					
9. Holding your child					
10. Reading to your child					
11. Getting up early in the morning with your child					
12. Going outside with your child					
13. Imitating your child					
14. Looking at your child					
15. Washing your child's clothes					
16. Hugging your child					
17. Tickling your child					
18. Kissing your child					

19. Getting up in the night with your child					
20. Changing your child's diaper					
21. Massaging your child					
22. Taking your child to public places					
23. Making funny faces at your child					
24. Punishing your child					
25. Taking pictures of your child					
26. Taking videos of your child					
27. Telling your child a story					
28. Dressing your child					
29. Spending time your child					
30. Cleaning up your child's mess					
31. Laughing with your child					
32. Singing to your child					
33. Cuddling your child					
34. Rocking your child					
35. Laying down with your child					

Consummatory Scale					
	No Pleasure	**Mild Pleasure**	**Moderate Pleasure**	**Great Pleasure**	**Extreme Pleasure**
36.Feeding your child					
37. Putting your child to bed					

38. Getting your child to stop crying					
39. Listening to your child cry					
40. Playing with your child					
41. Talking to your child					
42. Bathing your child					
43. Smiling at your child					
44. Holding your child					
45. Reading to your child					
46. Getting up early in the morning with your child					
47. Going outside with your child					
48. Imitating your child					
49. Looking at your child					
50. Washing your child's clothes					
51. Hugging your child					
52. Tickling your child					
53. Kissing your child					
54. Getting up in the night with your child					
55. Changing your child's diaper					
56. Massaging your child					
57. Taking your child to public places					
58. Making funny faces at your child					
59. Punishing your child					

60. Taking pictures of your child					
61. Taking videos of your child					
62. Telling your child a story					
63. Dressing your child					
64. Spending time your child					
65. Cleaning up your child's mess					
66. Laughing with your child					
67. Singing to your child					
68. Cuddling your child					
69. Rocking your child					
70. Laying down with your child					

Savoring Scale					
	No Pleasure	**Mild Pleasure**	**Moderate Pleasure**	**Great Pleasure**	**Extreme Pleasure**
71.Feeding your child					
72. Putting your child to bed					
73. Getting your child to stop crying					
74. Listening to your child cry					
75. Playing with your child					
76. Talking to your child					
77. Bathing your child					
78. Smiling at your child					

79. Holding your child					
80. Reading to your child					
81. Getting up early in the morning with your child					
82. Going outside with your child					
83. Imitating your child					
84. Looking at your child					
85. Washing your child's clothes					
86. Hugging your child					
87. Tickling your child					
88. Kissing your child					
89. Getting up in the night with your child					
90. Changing your child's diaper					
91. Massaging your child					
92. Taking your child to public places					
93. Making funny faces at your child					
94. Punishing your child					
95. Taking pictures of your child					
96. Taking videos of your child					
97. Telling your child a story					
98. Dressing your child					
99. Spending time your child					
100. Cleaning up your child's mess					

101. Laughing with your child					
102. Singing to your child					
103. Cuddling your child					
104. Rocking your child					
105. Laying down with your child					

Table 6

Item Pool: Post Study 1 Psychometric Analyses

Anticipatory Scale					
	No Desire	**Mild Desire**	**Moderate Desire**	**Great Desire**	**Extreme Desire**
1.Feeding your child					
2. Putting your child to bed					
3. Getting your child to stop crying					
4. Listening to your child cry					
5. Playing with your child					
6. Talking to your child					
7. Bathing your child					
8. Smiling at your child					
9. Holding your child					
10. Reading to your child					
11. Getting up early in the morning with your child					
12. Going outside with your child					
13. Imitating your child					
14. Looking at your child					
15. Washing your child's clothes					
16. Hugging your child					
17. Tickling your child					
18. Kissing your child					

19. Getting up in the night with your child					
20. Changing your child's diaper					
21. Massaging your child					
22. Taking your child to public places					
23. Making funny faces at your child					
24. Punishing your child					
25. Taking pictures of your child					
26. Taking videos of your child					
27. Telling your child a story					
28. Dressing your child					
29. Cleaning up your child's mess					
30. Laughing with your child					
31. Singing to your child					
32. Rocking your child					

Consummatory Scale					
	No Pleasure	**Mild Pleasure**	**Moderate Pleasure**	**Great Pleasure**	**Extreme Pleasure**
33.Feeding your child					
34. Putting your child to bed					
35. Getting your child to stop crying					
36. Listening to your child cry					
37. Playing with your child					

38. Talking to your child					
39. Bathing your child					
40. Smiling at your child					
41. Holding your child					
42. Reading to your child					
43. Getting up early in the morning with your child					
44. Going outside with your child					
45. Imitating your child					
46. Looking at your child					
47. Washing your child's clothes					
48. Hugging your child					
49. Tickling your child					
50. Kissing your child					
51. Getting up in the night with your child					
52. Changing your child's diaper					
53. Massaging your child					
54. Taking your child to public places					
55. Making funny faces at your child					
56. Punishing your child					
57. Taking pictures of your child					
58. Taking videos of your child					
59. Telling your child a story					

60. Dressing your child					
61. Cleaning up your child's mess					
62. Laughing with your child					
63. Singing to your child					
64. Rocking your child					

Savoring Scale					
	No Pleasure	**Mild Pleasure**	**Moderate Pleasure**	**Great Pleasure**	**Extreme Pleasure**
65.Feeding your child					
66. Putting your child to bed					
67. Getting your child to stop crying					
68. Listening to your child cry					
69. Playing with your child					
70. Talking to your child					
71. Bathing your child					
72. Smiling at your child					
73. Holding your child					
74. Reading to your child					
75. Getting up early in the morning with your child					
76. Going outside with your child					
77. Imitating your child					
78. Looking at your child					

79. Washing your child's clothes					
80. Hugging your child					
81. Tickling your child					
82. Kissing your child					
83. Getting up in the night with your child					
84. Changing your child's diaper					
85. Massaging your child					
86. Taking your child to public places					
87. Making funny faces at your child					
88. Punishing your child					
89. Taking pictures of your child					
90. Taking videos of your child					
91. Telling your child a story					
92. Dressing your child					
93. Cleaning up your child's mess					
94. Laughing with your child					
95. Singing to your child					
96. Rocking your child					

Table 7

Study 2 Item Mean, Kurtosis, Item-Total Correlations

Anticipatory Scale Items	Mean	Kurtosis	Item-Total Correlation
1.Feeding your child	3.37	2.44	.59
2. Putting your child to bed	3.32	1.48	.61
3. Getting your child to stop crying	3.26	1.12	.41
4. Listening to your child cry	1.10	-0.61	.27
5. Playing with your child	3.56	5.61	.68
6. Talking to your child	3.69	9.39	.68
7. Bathing your child	3.44	3.55	.76
8. Smiling at your child	3.84	27.08	.59
9. Holding your child	3.73	10.99	.58
10. Reading to your child	3.41	2.50	.54
11. Getting up early in the morning with your child	2.84	-0.51	.69
12. Going outside with your child	3.37	1.43	.64
13. Imitating your child	2.78	-0.80	.51
14. Looking at your child	3.80	19.04	.58
15. Washing your child's clothes	3.01	0.05	.63
16. Hugging your child	3.81	18.28	.53
17. Tickling your child	3.59	7.14	.53
18. Kissing your child	3.85	29.45	.55
19. Getting up in the night with your child	2.50	-1.01	.57
20. Changing your child's diaper	3.01	-0.11	.66
21. Massaging your child	3.20	0.80	.67
22. Taking your child to public places	3.33	1.33	.63
23. Making funny faces at your child	3.46	4.20	.64
24. Punishing your child	0.90	.45	.16
25. Taking pictures of your child	3.69	8.54	.67
26. Taking videos of your child	3.62	4.77	.52
27. Telling your child a story	3.48	4.54	.60
28. Dressing your child	3.52	1.50	.68
29. Cleaning up your child's mess	2.56	-0.95	.49
30. Laughing with your child	3.79	10.03	.49
31. Singing to your child	3.67	6.82	.58
32. Rocking your child	3.57	6.02	.47

Consummatory Scale Items	Mean	Kurtosis	Item-Total Correlation
33.Feeding your child	3.37	1.97	.64
34. Putting your child to bed	3.45	0.59	.55

35. Getting your child to stop crying	3.32	1.49	.32
36. Listening to your child cry	1.05	-0.47	.36
37. Playing with your child	3.73	2.59	.63
38. Talking to your child	3.79	3.16	.62
39. Bathing your child	3.54	1.48	.74
40. Smiling at your child	3.84	3.95	.64
41. Holding your child	3.82	22.31	.54
42. Reading to your child	3.54	4.31	.58
43. Getting up early in the morning with your child	2.84	-0.49	.58
44. Going outside with your child	3.49	3.19	.57
45. Imitating your child	3.10	0.42	.41
46. Looking at your child	3.83	5.97	.52
47. Washing your child's clothes	2.96	-0.27	.66
48. Hugging your child	3.87	9.69	.58
49. Tickling your child	3.78	12.38	.48
50. Kissing your child	3.91	12.25	.45
51. Getting up in the night with your child	2.46	-1.15	.53
52. Changing your child's diaper	2.69	-0.77	.59
53. Massaging your child	3.36	1.75	.59
54. Taking your child to public places	3.42	3.01	.61
55. Making funny faces at your child	3.64	5.95	.58
56. Punishing your child	0.94	0.04	.34
57. Taking pictures of your child	3.73	4.56	.67
58. Taking videos of your child	3.74	2.68	.67
59. Telling your child a story	3.55	6.23	.67
60. Dressing your child	3.51	1.30	.72
61. Cleaning up your child's mess	2.57	-1.10	.61
62. Laughing with your child	3.82	6.35	.63
63. Singing to your child	3.71	9.66	.62
64. Rocking your child	3.72	5.17	.58

Savoring Scale Items	Mean	Kurtosis	Item-Total Correlation
65.Feeding your child	3.42	2.33	.70
66. Putting your child to bed	3.44	1.39	.76
67. Getting your child to stop crying	3.25	0.06	.57
68. Listening to your child cry	1.35	-1.31	.32
69. Playing with your child	3.73	11.89	.80
70. Talking to your child	3.75	14.42	.76
71. Bathing your child	3.67	7.72	.72
72. Smiling at your child	3.79	7.80	.75
73. Holding your child	3.78	10.57	.73
74. Reading to your child	3.63	9.29	.68

75. Getting up early in the morning with your child	2.96	-0.31	.66
76. Going outside with your child	3.54	5.26	.74
77. Imitating your child	3.14	0.33	.57
78. Looking at your child	3.77	13.76	.78
79. Washing your child's clothes	2.99	-0.26	.68
80. Hugging your child	3.80	8.25	.72
81. Tickling your child	3.71	10.86	.65
82. Kissing your child	3.77	15.89	.60
83. Getting up in the night with your child	2.75	-0.82	.63
84. Changing your child's diaper	2.90	-0.35	.62
85. Massaging your child	3.42	2.82	.64
86. Taking your child to public places	3.47	3.33	.64
87. Making funny faces at your child	3.65	8.38	.81
88. Punishing your child	1.22	-1.03	.35
89. Taking pictures of your child	3.73	4.65	.77
90. Taking videos of your child	3.71	3.73	.73
91. Telling your child a story	3.60	6.69	.70
92. Dressing your child	3.55	3.69	.73
93. Cleaning up your child's mess	2.73	-1.07	.61
94. Laughing with your child	3.80	10.29	.70
95. Singing to your child	3.75	11.90	.76
96. Rocking your child	3.70	9.87	.66

Table 8

Parallel Analysis of the MIRE Using 1,000 Random Permutations of the Raw Data

Factors	Raw data eigenvalues	Mean random eigenvalues	95th %tile eigenvalues
1	14.78	2.00	2.15
2	2.85	1.86	1.96
3	2.12	1.76	1.84
4	1.68	1.67	1.73
5	1.27	1.59	1.66
6	1.16	1.52	1.57
7	1.02	1.45	1.51

Table 9

Factor Loadings of MIRE Items Specified by Parallel Analysis

Item #	Factor 1	Factor 2	Factor 3
1	.38	.06	.69
2	.08	.28	.73
3	-.04	.06	.74
11	.70	.16	.32
13	.10	.80	.21
15	.58	.07	.54
19	.68	-.04	.29
20	.59	.07	.48
21	.40	.46	.42
28	.56	.30	.44
30	.69	.07	.28
36	.63	.15	.35
37	.35	.32	.48
38	.07	.17	.69
46	.73	.08	.04
48	.09	.86	.02
50	.80	.18	.20
54	.79	.02	.01
55	.77	.07	.33
56	.38	.45	.31
63	.65	.33	.31
65	.76	.25	.07
71	.59	.31	.21
72	.45	.50	.21
73	.32	.36	.34
81	.74	.30	.02
83	.07	.85	.11
85	.82	.32	.17
89	.78	.28	-.01
90	.79	.25	.20
91	.28	.71	.20
98	.50	.40	.39
100	.73	.34	.03

Table 10

Final Measure After Item Analysis

Anticipatory Scale					
	No Desire	**Mild Desire**	**Moderate Desire**	**Great Desire**	**Extreme Desire**
1. Feeding your child					
2. Putting your child to bed					
3. Getting your child to stop crying					
4. Getting up early in the morning with your child					
5. Imitating your child					
6. Washing your child's clothes					
7. Getting up in the night with your child					
8. Dressing your child.					
9. Massaging your child.					
10. Changing your child's diaper					
11. Cleaning up your child's mess					

Consummatory Scale					
	No Pleasure	**Mild Pleasure**	**Moderate Pleasure**	**Great Pleasure**	**Extreme Pleasure**
12. Feeding your child					
13. Putting your child to bed					
14. Getting your child to stop crying					
15. Getting up early in the morning with your child					
16. Imitating your child					
17. Washing your child's					

clothes					
18. Getting up in the night with your child					
19. Dressing your child.					
20. Massaging your child.					
21. Changing your child's diaper					
22. Cleaning up your child's mess					

Savoring Scale					
	No Pleasure	**Mild Pleasure**	**Moderate Pleasure**	**Great Pleasure**	**Extreme Pleasure**
23. Feeding your child					
24. Putting your child to bed					
25. Getting your child to stop crying					
26. Getting up early in the morning with your child					
27. Imitating your child					
28. Washing your child's clothes					
29. Getting up in the night with your child					
30. Dressing your child.					
31. Massaging your child.					
32. Changing your child's diaper					
33. Cleaning up your child's mess					

Table 11

Study 1 Means of, Standard Deviations of, and Intercorrelations between MIRE and All Study Variables.

	1	2	3	4	5	6	7	8
1. MIRE Desire	-							
2. MIRE Pleasure	.69**	-						
3. MIRE Savoring	.58**	.80**	-					
4. TPI Desire	.30	-.05	-.16	-				
5. TPI Pleasure	.27	-.04	-.14	.95**	-			
6. SBI Savoring	-.08	-.16	-.04	.35	.39*	-		
7. CES-D	-.48**	-.41*	-.36*	-.44*	-48*	-.41*	-	
8. PSI PD	-.35*	-.32	-.22	-.19	-.26	-.16	.32	-
9. PSI PCDI	-.30	-.20	-.13	.03	-.00	-.09	.17	.10
10. PSI DC	-.29	-.26	-.24	.17	.11	-.09	.23	.20
11. PSI TS	-.44*	-.37*	-.29	-.02	-.10	-.17	.35	.71**
12. IBQ PAS	.66*	.18	.06	.27	.24	.27	-.47	-.28
13. IBQ NEG	.29	.37	.06	.01	.02	-.07	-.30	-.26
14. IBQ ORC	.73**	.21	.03	.19	.18	.24	-.38	-.14
15. ITSEA EXT	-.44	-.37	-.25	.32	.44	.06	.11	.46
16. ITSEA INT	-.30	-.33	-.11	.22	.25	-.03	.03	.36
Mean	3.14	2.95	3.11	2.85	2.91	5.26	10.32	26.77
SD	.53	.67	.74	.88	.84	1.00	5.95	8.24

Note. * $p < .05$; **$p<.01$;*MIRE=Mother Inventory of Reward Responsivity; TPI= Tripartite Pleasure Inventory; CES-D= Center for Epidemiologic Studies Depression Scale; PSI=Parenting Stress Index: PD=Parental Distress, PCDI=Parent Child Dysfunctional Interaction, DC=Difficult Child, TS=Total Stress; IBQ=Infant Behavior Questionnaire: PAS=Positive Affectivity/Surgency, NEG=Negative Emotionality, ORC= Orienting/Regulatory Capacity; ITSEA= Infant-Toddler Social and Emotional Assessment: EXT=Externalizing, INT=Internalizing; The IBQ and ITSEA subscales have no correlations as mothers who completed the IBQ did not complete the ITSEA and vise versa.*

Table 11 Continued

Study 1 Means of, Standard Deviations of, and Intercorrelations between MIRE and All Study Variables Continued.

	9	10	11	12	13	14	15	16
1. MIRE Desire								
2. MIRE Pleasure								
3. MIRE Savoring								
4. TPI Desire								
5. TPI Pleasure								
6. SBI Savoring								
7. CES-D								
8. PSI PD								
9. PSI PCDI	-							
10. PSI DC	.59**	-						
11. PSI TS	.66**	.78**	-					
12. IBQ PAS	-.15	-.41	-.37	-				
13. IBQ NEG	-.28	-.00	-.24	.40	-			
14. IBQ ORC	-.33	-.50	-.38	.88**	.32	-		
15. ITSEA EXT	.08	.21	.38				-	
16. ITSEA INT	.18	.47	.48				.56*	-
Mean	16.77	23.77	67.32	5.61	4.17	5.58	.46	.45
SD	4.70	6.83	14.42	1.10	1.35	.91	.28	.23

Note. * $p < .05$; **$p<.01$;*MIRE=Mother Inventory of Reward Responsivity; TPI= Tripartite Pleasure Inventory; CES-D= Center for Epidemiologic Studies Depression Scale; PSI=Parenting Stress Index: PD=Parental Distress, PCDI=Parent Child Dysfunctional Interaction, DC=Difficult Child, TS=Total Stress; IBQ=Infant Behavior Questionnaire: PAS=Positive Affectivity/Surgency, NEG=Negative Emotionality, ORC= Orienting/Regulatory Capacity; ITSEA= Infant-Toddler Social and Emotional Assessment: EXT=Externalizing, INT=Internalizing; The IBQ and ITSEA subscales have no correlations as mothers who completed the IBQ did not complete the ITSEA and vise versa.*

Table 12

Study 2 Means of, Standard Deviations of, and Intercorrelations between MIRE and All Study Variables.

	1	2	3	4	5	6	7	8
1. MIRE Desire	-							
2. MIRE Pleasure	.81**	-						
3. MIRE Savoring	.70**	.83**	-					
4. TPI Desire	.30**	.21**	.28**	-				
5. TPI Pleasure	.36**	.27**	.32**	.63**	-			
6. SBI Savoring	.06	.09	.05	.15*	.25**	-		
7. CES-D	-.17**	-.20**	-.15*	-.12	-27*	-.47**	-	
8. PSI PD	-.31**	-.36**	-.24**	-.11	-.31**	-.44**	.54**	-
9. PSI PCDI	-.18*	-.22**	-.13	.15*	-.20**	-.30**	.46**	.55**
10. PSI DC	-.42**	-.39**	-.34**	.19**	-.25**	-.31**	.44**	.56**
11. PSI TS	-.36*	-.38**	-.28**	-.18*	-.30**	-.41**	.56**	.84**
12. IBQ PAS	.30*	.18	.28*	-.10	-.13	-20	.17	.10
13. IBQ NEG	-.23	-.12	-.12	-.14	-.20	-.23	.21	.32*
14. IBQ ORC	.38**	.36**	.22	.33*	.36**	.15	-.17	-.20
15. ITSEA EXT	-.33**	-.26*	-.27*	-.14	-.09	-.17	-.03	.41**
16. ITSEA INT	-.21	-.20	-.18	-.09	-.18	-.14	.06	.44**
Mean	3.04	3.07	3.13	3.01	3.21	5.66	10.30	22.44
SD	.74	.75	.84	.74	.62	1.11	9.05	9.27

Note. * $p < .05$; **$p<.01$;*MIRE=Mother Inventory of Reward Responsivity; TPI= Tripartite Pleasure Inventory; CES-D= Center for Epidemiologic Studies Depression Scale; PSI=Parenting Stress Index: PD=Parental Distress, PCDI=Parent Child Dysfunctional Interaction, DC=Difficult Child, TS=Total Stress; IBQ=Infant Behavior Questionnaire: PAS=Positive Affectivity/Surgency, NEG=Negative Emotionality, ORC= Orienting/Regulatory Capacity; ITSEA= Infant-Toddler Social and Emotional Assessment: EXT=Externalizing, INT=Internalizing; The IBQ and ITSEA subscales have no correlations as mothers who completed the IBQ did not complete the ITSEA and vise versa.*

Table 12 Continued

Study 2 Means of, Standard Deviations of, and Intercorrelations between MIRE and All Study Variables Continued.

	9	10	11	12	13	14	15	16
1. MIRE Desire								
2. MIRE Pleasure								
3. MIRE Savoring								
4. TPI Desire								
5. TPI Pleasure								
6. SBI Savoring								
7. CES-D								
8. PSI PD								
9. PSI PCDI	-							
10. PSI DC	.65**	-						
11. PSI TS	.85**	.87**	-					
12. IBQ PAS	.15	.14	.15	-				
13. IBQ NEG	.25	.33*	.36**	.26	-			
14. IBQ ORC	.00	-.16	-.16	.14	-.07	-		
15. ITSEA EXT	.28*	.57**	.50**				-	
16. ITSEA INT	.38**	.48**	.50**				.65**	-
Mean	17.05	21.14	59.92	5.14	3.89	5.58	.42	.41
SD	8.06	8.87	22.54	1.27	1.31	.68	.32	.29

Note. * $p < .05$; **$p<.01$;*MIRE=Mother Inventory of Reward Responsivity; TPI= Tripartite Pleasure Inventory; CES-D= Center for Epidemiologic Studies Depression Scale; PSI=Parenting Stress Index: PD=Parental Distress, PCDI=Parent Child Dysfunctional Interaction, DC=Difficult Child, TS=Total Stress; IBQ=Infant Behavior Questionnaire: PAS=Positive Affectivity/Surgency, NEG=Negative Emotionality, ORC= Orienting/Regulatory Capacity; ITSEA= Infant-Toddler Social and Emotional Assessment: EXT=Externalizing, INT=Internalizing; The IBQ and ITSEA subscales have no correlations as mothers who completed the IBQ did not complete the ITSEA and vise versa.*

Table 13

Regression Model of MIRE and TPI Scores Predicting CES-D Total Score.

Model	Est.	S.E.	Z	*P*
Model 1 [$R^2 = 0.09$, *p=.05*]				
Sex	-0.06	0.08	-0.76	0.45
Age	-0.07	0.08	-0.89	0.37
TPI Score	-0.28	0.08	-3.69*	0.00
Model 2 [$R^2 = 0.10$, *p=.04*]				
Sex	-0.87	1.45	-0.60	0.55
Age	-0.07	0.07	-1.14	0.26
MIRE Score	-1.11	1.19	-0.93	0.35
TPI Score	-3.68	1.38	-2.66*	0.01

Note. *denotes statistically significant z-value. *MIRE=Mother Inventory of Reward Responsivity; TPI= Tripartite Pleasure Inventory; CES-D= Center for Epidemiologic Studies Depression Scale*

Table 14

Regression Model of MIRE and TPI Scores Predicting PSI Total Stress.

Model	Est.	S.E.	Z	*P*
Model 1 [$R^2 = 0.14$, *p=.01*]				
Sex	-1.36	3.35	-0.41	0.68
Age	0.17	0.14	1.18	0.24
TPI Score	-13.15	2.84	-4.64*	0.00
Model 2 [$R^2 = 0.19$, *p < .001*]				
Sex	0.36	3.28	0.11	0.91
Age	0.03	0.15	0.21	0.84
MIRE Score	-8.36	2.69	-3.11*	0.00
TPI Score	-8.45	3.13	-2.70*	0.01

Note. *denotes statistically significant z-value. *MIRE=Mother Inventory of Reward Responsivity; TPI= Tripartite Pleasure Inventory; PSI=Parenting Stress Index*

Table 15

Regression Model of MIRE and TPI Scores Predicting IBQ PAS

Model	Est.	S.E.	Z	*P*
Model 1 [$R^2 = 0.34$, $p < .001$]				
Sex	0.04	0.30	0.15	0.88
Age	0.21	0.04	5.00*	0.00
TPI Score	-0.09	0.26	-0.34	0.74
Model 2 [$R^2 = 0.43$, $p < .001$]				
Sex	-0.15	0.28	-0.51	0.61
Age	0.21	0.04	5.45*	0.00
MIRE Score	0.77	0.27	2.90*	0.00
TPI Score	-0.36	0.26	-1.38	0.17

Note. *denotes statistically significant z-value; *MIRE=Mother Inventory of Reward Responsivity; TPI= Tripartite Pleasure Inventory; IBQ PAS=Infant Behavior Questionnaire Positive Affectivity/Surgency.*

Table 16

Regression Model of MIRE and TPI Scores Predicting IBQ NEG

Model	Est.	S.E.	Z	*P*
Model 1 [$R^2 = 0.09$, *p=.24*]				
Sex	-0.16	0.35	-0.45	0.65
Age	0.10	0.05	2.08*	0.04
TPI Score	-0.25	0.31	-0.81	0.42
Model 2 [$R^2 = 0.11$, *p =.19*]				
Sex	-0.07	0.36	-0.20	0.84
Age	0.10	0.05	2.09*	0.04
MIRE Score	-0.35	0.34	-1.04	0.30
TPI Score	-0.13	0.33	-0.39	0.70

Note. *denotes statistically significant z-value; *MIRE=Mother Inventory of Reward Responsivity; TPI= Tripartite Pleasure Inventory; IBQ NEG=Infant Behavior Questionnaire Negative Emotionality.*

Table 17

Regression Model of MIRE and TPI Scores Predicting IBQ ORC

Model	Est.	S.E.	Z	*P*
Model 1 [$R^2 = 0.19$, *p=.05*]				
Sex	0.25	0.17	1.43	0.15
Age	-0.01	0.02	-0.12	0.91
TPI Score	0.49	0.15	3.16*	0.00
Model 2 [$R^2 = 0.24$, *p =.02*]				
Sex	0.17	0.17	1.01	0.39
Age	-0.01	0.02	-0.09	0.98
MIRE Score	0.30	0.16	1.84*	0.05
TPI Score	0.38	0.16	2.39*	0.02

Note. *denotes statistically significant z-value; *MIRE=Mother Inventory of Reward Responsivity; TPI= Tripartite Pleasure Inventory; IBQ ORC= Infant Behavior Questionnaire Orienting/Regulatory Capacity.*

Table 18

Regression Model of MIRE and TPI Scores Predicting ITSEA EXT

Model	Est.	S.E.	z	*P*
Model 1 [$R^2 = 0.04$, *p=.35*]				
Sex	-0.04	0.09	-0.44	0.66
Age	-0.01	0.01	-0.94	0.35
TPI Score	-0.11	0.08	-1.33	0.18
Model 2 [$R^2 = 0.09$, *p =.18*]				
Sex	-0.03	0.08	-0.36	0.72
Age	-0.01	0.01	-0.86	0.39
MIRE Score	-0.11	0.06	-1.73	0.08
TPI Score	-0.01	0.10	-0.12	0.91

Note. *denotes statistically significant z-value; *MIRE=Mother Inventory of Reward Responsivity; TPI= Tripartite Pleasure Inventory; ITSEA EXT= Infant-Toddler Social and Emotional Assessment Externalizing.*

Table 19

Regression Model of MIRE and TPI Scores Predicting ITSEA INT

Model	Est.	S.E.	z	*P*
Model 1 [$R^2 = 0.08$, *p=.20*]				
Sex	0.12	0.07	1.70	0.09
Age	0.01	0.01	0.38	0.70
TPI Score	-0.14	0.07	-2.11	0.04
Model 2 [$R^2 = 0.10$, *p =.16*]				
Sex	0.13	0.07	1.76	0.08
Age	0.01	0.01	0.44	0.66
MIRE Score	-0.05	0.06	-0.96	0.34
TPI Score	-0.10	0.08	-1.18	0.24

Note. *denotes statistically significant z-value; *MIRE=Mother Inventory of Reward Responsivity; TPI= Tripartite Pleasure Inventory; ITSEA INT= Infant-Toddler Social and Emotional Assessment Internalizing.*

Figure 1

Steps To Developing a Scale

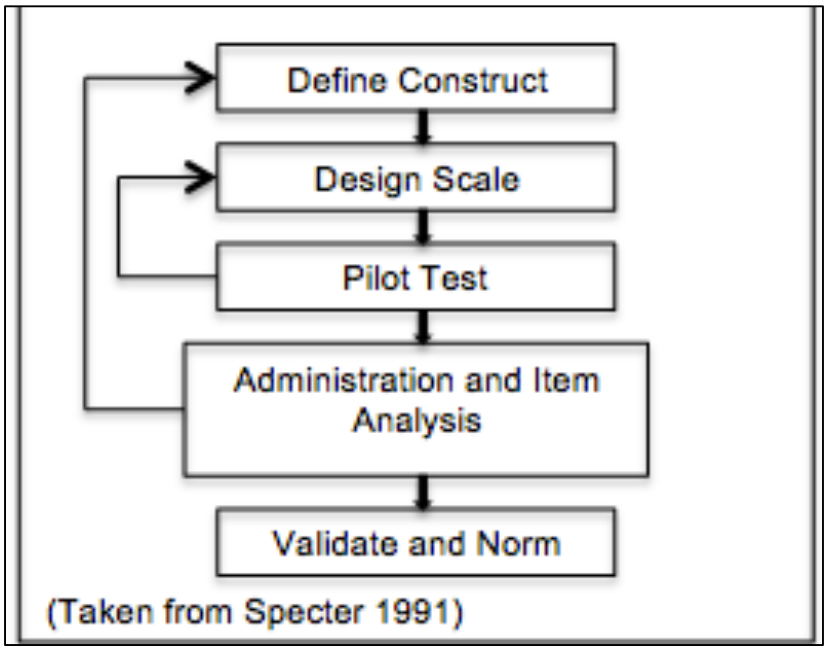
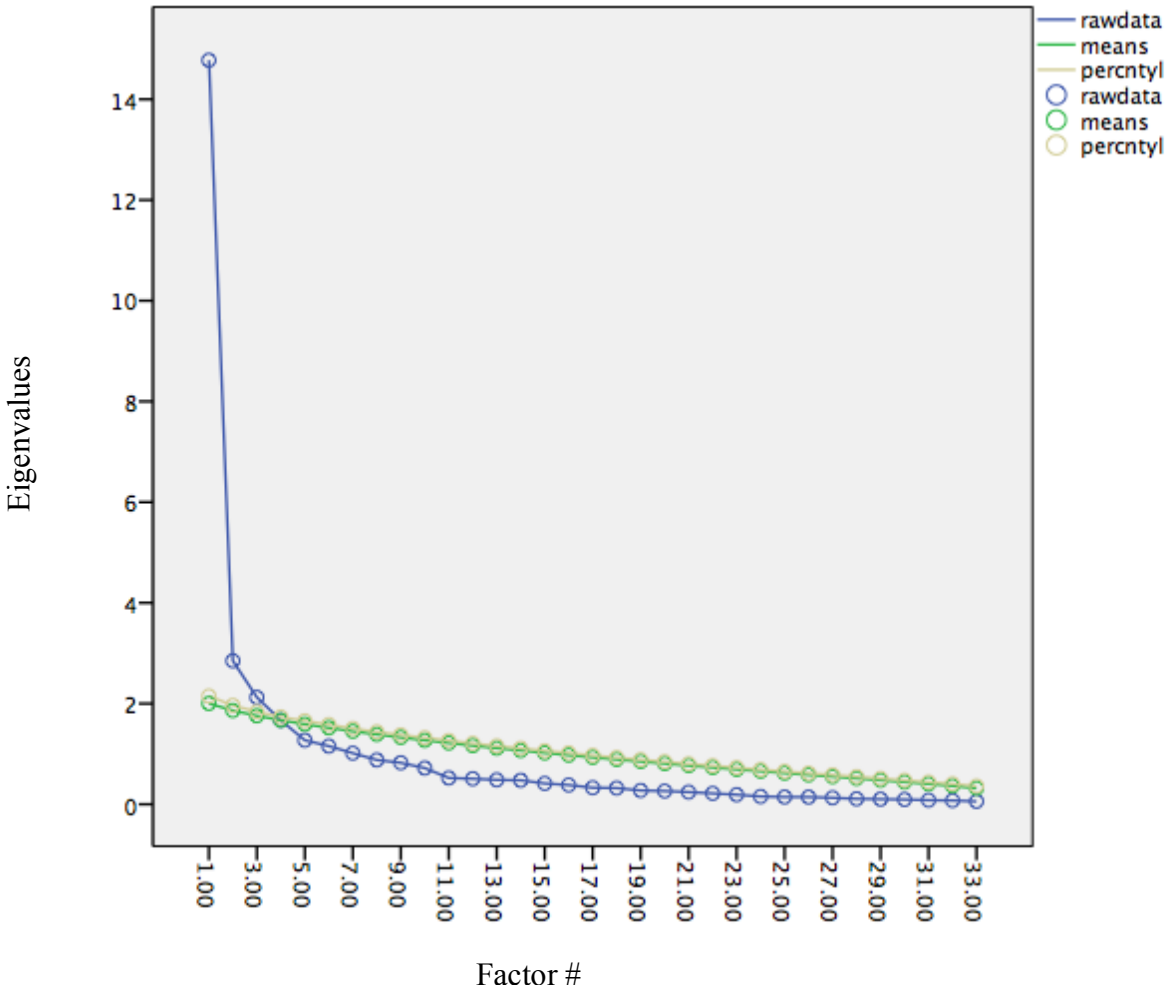


Figure 2

Scree Plot from the EFA with Parallel Analysis



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PUBLICATIONS AND PRESENTATIONS

Barroso, N., Hartley, C. M., Bagner, D. M., & Pettit, J. W. (2013, November). Mediating Effects of Postpartum Depression on the Relation Between Preterm Birth and Infant Temperament. Poster presented at the 47th Annual ABCT Convention, Nashville, TN.

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