

**The Moderating Role of Mindfulness on the Relationship between
Parental Stress and Response to Child**

Deanna Swain

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Angela Scarpa-Friedman, Committee Chair
Kirby Deater-Deckard
Thomas Ollendick

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ABSTRACT

Increased stress levels due to parenting have been shown to correlate to harsher parenting responses towards children (Belsky, 1984). Mindfulness, however, suggests the ability to focus on the present moment in a nonjudgmental and nonreactive manner. Similarly, parents with increased mindfulness have reported more open dialogue and warmth with their child (Williams & Wahler, 2010). Few studies have examined an ecologically valid test measuring the constructs of stress reactivity together with parent and child observed interaction. This study examined the moderating role of mindfulness and its effect on the relationship between parenting stress reactivity and parent response to child. Thirty-nine mother and child dyads participated in a validated activity-based parent-child interaction task designed to measure the level of maternal criticism directed toward child via behavioral coding. Mother's heart rate (HR) was monitored to determine the physiological measure of stress reactivity. Mothers also completed self-report forms to indicate levels of mindfulness, perceived stress-reactivity and parenting feelings. Results demonstrated significant main effects for parent self-reported levels of stress reactivity to social challenges and mindful non-reactivity on self-reported parent negative feelings; however, these main effects were better accounted by mother depression, stress, and child age. Mindfulness significantly predicted in-lab levels of mother critical response to child. Additionally, results indicated a significant interaction between mindfulness and perceived stress reactivity, such that mindfulness predicted less criticism toward the child in parents who reported

low stress reactivity. Given the low sample size and subsequent low power, results should be viewed with caution.

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Introduction

Adults encounter a multitude of stressors on a daily basis. Whether it is the stress from having to pay the bills on time, interacting with challenging people, or going to work, these stressful stimuli are subjective and therefore depend on the individual's perception of the events and situations. Parents face a unique addition of stress that is associated with the demands of the parenting role. All parents experience stress related to parenting to some extent, although individuals react differently to stress. On the one hand, stress can serve an advantageous role in one's life in terms of motivation. On the other hand, stress can have deleterious effects not only on the functioning of the individual experiencing the stress but those who interact with him or her (e.g., children, spouse, friends). In fact, the distress from parenting has been shown to develop strained parent-child relationships as well as contribute to adult and child psychopathology (Deater-Deckard, 1998). As a result, it is important to study coping strategies for parental stress and their effects on the parent-child relationship. Mindfulness will be examined in this study as one potential coping mechanism that can impact how well parents respond to stress. The aim of this study was to assess the moderating effect of mindfulness on the relationship between parenting stress and parenting response to child.

Parenting Stress

Parenting stress is a complex process that includes the external demands of parenting, quality of the relationship between parent and child, as well as the emotional and social well being of the parent and child. Parenting stress can be defined as the "aversive psychological reaction" and experience of "negative feelings toward the self and toward the child or children, and by definition these negative feelings are directly attributable to the demands of parenthood" (Deater-Deckard, 1998; p 315). Studies have shown that high parenting stress is related to

decreased involvement with children (McBride & Mills, 1994). Therefore, it is important not just to study the effects of parenting stress on the parent (i.e. psychological well-being) but also to be cognizant of the consequential effects on children.

Parents' response to this stress (i.e. acute and chronic) may elucidate the relationship between parenting stress and parenting practices. That is, regardless of the chronic levels of overall stress, parents will respond differently when faced with various stressors (e.g. social, physical, emotional). These physiological reactions have been comprehensively studied by measuring change in autonomic response to social stressors through heart rate (Kudielka, Buske-Kirschbaum, Hellhammer, & Kirschbaum, 2004), heart rate variability (Appelhans & Luecken, 2006), blood pressure (Smith & Allred, 1989), and cortisol (Kirschbaum, Pirke, & Hellhammer, 1993) in response to laboratory stressors. In addition to biological and physiological changes, self-report measures of stress reactivity have been utilized to capture individual's perception of his or her response to stress. For example, Britton and colleagues (2011) measured individuals' reactivity to a social stress before and after completing an 8-week Mindfulness-Based Cognitive Treatment (MBCT) course with the Spielberger State Anxiety Inventory (STAI) before, during and after the laboratory stressor. In addition, Schultz and colleagues (2005) developed a self-report questionnaire to assess individual's perceptions of reactivity to stress in multiple domains (e.g., work stress, social stress, failure). Since then, it has been revised and validated in multiple countries and illustrated as comparable to physiological levels of cortisol during a social stress task (Schlotz, Hammerfald, Ehlert, & Gaab, 2011).

Parenting Practices

Parenting stress directly affects both parenting skills and styles, which in turn influence the actions of parents toward their children. For example, many parents become more rejecting

and reactive as well as less warm towards their children when under increased levels of parental stress (e.g., Belsky, 1984; Webster-Stratton, 1990). Previous literature supports the idea of three main parenting styles: authoritarian, authoritative and permissive (Baumrind, 1966; Grolnick & Ryan, 1989; Robinson, Mandleco, Olsen, & Hart, 1995). Authoritative parenting style has been conceptualized as open communication between parent and child in addition to appropriate conflict management. In contrast, authoritarian parents demonstrate one extreme end of the spectrum by dealing with conflict in a harsh manner with limited dialogue and permissive mothers, on the other extreme, avoid conflict altogether, acting more as peers than parents. Deater-Deckard and Scarr (1996) report that parents who experience higher levels of parenting stress are more likely to demonstrate negative and authoritarian parenting techniques. In addition, Crnic and associates (2005) found that cumulative parenting daily hassles predicted decreased maternal positivity in interactions with their 5-year-old children. Furthermore, Miller-Lewis and colleagues (2006) found parental reactivity to be a single significant predictor of chronic externalizing problems in 6-year-old children. Dumas (2005) proposed that “automatized transactional procedures” perpetuate patterns of disagreement and conflict between caregivers and children. These negative interactions then become overlearned to the point of automaticity due to repetition in practice, thus creating a negative cycle that can lead to negative and critical parenting behaviors, toward his or her child.

Parent psychological functioning has also been shown to impact parenting behaviors. For example, anxious mothers have been found to demonstrate less warmth during interactions with their children (Hudson & Rapee, 2001; Moore, Whaley, & Sigman, 2004). Furthermore, mothers characterized by symptoms of depression expressed more negative commands and threats towards child during parent-child interaction task (Lovejoy, 1991). These parental characteristics

may play an influencing role on parenting behavior above and beyond parent's reaction to stress and level of mindfulness. As such, maternal anxiety and depression need to be considered as possible confounds when analyzing the relationship between stress and parenting response.

Mindfulness

Mindfulness, the ability to nonjudgmentally bring awareness to the present moment, may serve as a cognitive tool to positively influence one's stress response. The practice of mindfulness, especially through the utilization of meditation, originated from the Buddhist discipline (Brown, Ryan, & Creswell, 2007). Kabat-Zinn (2003), one of the first psychologists to incorporate these eastern philosophic ideas into western psychological practice, defined mindfulness as the "awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment" (p 145).

There is disagreement regarding the conceptualization of the mindfulness construct. Several researchers view mindfulness as a unitary construct while others argue that it is multifaceted (Chiesa, 2013). While the Mindfulness Awareness and Acceptance Scale (MAAS; Brown & Ryan, 2003) has been well-validated and utilized in many studies, it may be best defined as a measure of awareness and acceptance, leaving out important components such as nonreactivity, nonjudgment and openness. The MAAS also relies on the assumption that mindfulness and mindlessness are opposite constructs. In stark contrast, the creators of the Kentucky Inventory of Mindfulness Scale (KIMS; Baer, Smith, & Allen, 2004) and the Five Facet Mindfulness Scale (FFMS; Baer, Smith, Hawkins, Krietemeyer, & Toney, 2006) argue that mindfulness is better conceptualized as a combination of multiple skills or facets. For example, the FFMS was created by performing an exploratory factor analysis when providing questions from 5 different mindfulness scales to college students. Results indicated that five distinct

subscales factored together (i.e., nonreactivity to inner experience, observing, describing, acting with awareness, and nonjudging of inner experience). For the purposes of this study, mindfulness is conceptualized as a multifaceted state and trait concept, meaning that this construct is an amalgamation of separate facets, such as nonreactivity.

In recent decades, the fundamental principles of mindfulness have been applied to a variety of different contexts including clinical settings (Hofmann, Sawyer, Witt, & Oh, 2010). Interventions such as dialectical behavior therapy (DBT; Linehan, 1993), mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982), mindfulness-based cognitive therapy (MBCT; Segal, Teasdale, & Williams, 2004) and acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson, 1999) conceptualize mindfulness as a “set of skills that can be learned and practiced in order to reduce psychological symptoms and increase health and well-being” (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; p.27). While many intervention studies have relied on pre and post self-report measures to determine gains made during treatment, some have incorporated more objective measures.

In addition to intervention studies, mindfulness has primarily been studied via self-report questionnaires in correlational studies or in brief laboratory inductions of mindfulness, which have shown personal experiential psychological and physiological change. For example, researchers show that increased levels of mindfulness facilitates a reduction in negative reactions to distressing situations (Feltman, Robinson, & Ode, 2009; Bergomi, Ströhle, Michalak, Funke, & Berking, 2013). As such, mindfulness may serve as an adaptive coping strategy during the experience of aversive situations, resulting in a more effective recovery from perceptions of as well as occurrence of distressing events. By changing an individual’s relationship with the appraisal of stressful events, one can expect to see changes in behavior and emotions.

Mindful Parenting

In a similar manner of individual perception of stress, mindfulness increases one's ability to view a child or situation in a nonjudgmental and open way, which then allows a parent to move beyond rigid or automatic behavior (e.g. yelling or aggression) and provides the opportunity to explore multiple options when facing a problem solving situation. As such, mindfulness becomes more of a mindset or attitude rather than a specific behavior.

Several studies have examined the effects of mindful parenting, indicating increases in satisfaction with parenting and overall quality of life (e.g., Bögels, Lehtonen, & Restifo, 2010; Singh, Lancioni, Winton, Singh, Curtis, Wahler, & McAleavey, 2007). While the mindfulness training did not target child behaviors, post-intervention measurements of child aggressive behavior decreased and positive interactions of target children with siblings increased (Singh et al., 2007). This study illustrates the potentially powerful effects of mindfulness training for high-stress parents and the extension of mindfulness practice outcomes beyond targeted behavior.

Duncan, Coatsworth and Greenberg (2009) propose a model of “mindful-parenting” that illustrates the interaction between mindful-parenting, child management practices, parental well-being, parent-child affection and how those factors influence youth problem and positive outcomes. In particular, mindful parenting reflects listening with full attention, nonjudgmental acceptance of self and child, emotional awareness of self and child, self-regulation in the parenting relationship and compassion for self and child. This rationale extends the principles of mindfulness from solely focusing on the parent to the interpersonal relationship between parent and child.

Williams and Wahler (2010) showed that levels of mindfulness in mothers was positively correlated to levels of authoritative parenting style and negatively correlated to authoritarian

parenting style, characterized by critical and harsh parenting responses. As one would expect, parents with higher levels of mindfulness also exhibited increased levels of self-reported warmth and dialogue and decreased levels of self-reported critical and harsh interactions. As such, a mother's attainment of a mindful state may permit her to decenter and objectively evaluate her judgment or negative automatic tendency toward her child, leading her to respond in a more open and less critical manner. As a result, this mindful process could allow her to see the differences among situations thought to be similar (e.g. my child always blows up but perhaps I should observe the situation objectively) and similarities among things assumed to be different (e.g. I tend to utilize control tactics to solve problems with my child and perhaps I should encourage his or her opinion via supportive dialogue; Langer, 2000; Bögels, Lehtonen, & Restifo, 2010).

While researchers have begun to show promising results from mindfulness intervention studies and larger correlational self-report studies on the effects of mindfulness and reduction in stress reactivity, to the best of our knowledge, none have examined the specific underlying mechanisms related to stress responsivity and its effect on parent-child interactions. This study will use a multi-method approach combining self-report measures with a standardized stressful parent-child interaction task in the laboratory to measure stress reactivity and parenting responses, thus allowing for more control than clinical interventions or correlational studies. This study builds on the current knowledge and provides greater insight into the mechanisms of mindfulness on mothers and their response to child.

Hypotheses

As discussed above, understanding the appraisal of stressful situations is an important component to elucidating the impact of parental stress on parent response to his or her child during a parent-child interaction. As such, it is possible that individuals with high levels of

mindfulness may be able to successfully cope with a stressful situation and not react behaviorally in a manner that negatively affects the parent-child relationship. Individuals with low levels of mindfulness, however, may experience the same stressful situation and react behaviorally in a manner that does negatively affect the parent-child relationship. Therefore, it was hypothesized that high levels of mindfulness would moderate the effects of stress reactivity (i.e., measured via self-report and physiologically) on parent responsiveness to the child during a stressful parent-child interaction task and self-reported levels of critical response to child. Specifically, main effects of stress reactivity and mindfulness on parenting response (i.e. higher reactions to stress will be associated with more critical comments to child and higher level of mindfulness will be related to fewer critical comments) were anticipated. Finally, we expected to find an interaction effect between mindfulness and stress reactivity on parenting response, such that the positive relationship between stress reactivity and critical comments would be buffered in mothers with high mindfulness scores.

Method

Participants

The total sample included 39 mother and child pairs. Mothers ranged in age from 31 to 49 years ($M = 39.24$, $SD = 4.94$) and consisted of 74.4% Caucasian and 17.1% Asian American/Asian Origin. The majority of mothers were married (74.4%). See Tables 1 and 2 for a more complete list of the descriptive statistics. Mothers were chosen as the parent of interest because previous research suggests that fathers vary significantly more than mothers in their interaction style with their son and/or daughter (McBride, Schoppe, & Rane, 2002). Therefore, in order to keep a more homogeneous sample, only mothers were used for this study. Further inclusionary criteria for mothers involved English speaking and no history of cardiovascular

disease. Children included in this study ranged from 7 to 12 years of age ($M = 8.78$, $SD = 1.46$) and consisted of 64.1% Caucasian, 17.9% Asian American/Asian origin, 2.6% African American, and 2.6% Hispanic. Hudson and Rapee (2001) validated the parent-child activity-based interaction task with this population range.

Power

Researchers proposed to perform a moderation analysis using multiple regression analyses with three predictor variables, based on the methods of Cohen, Cohen, West, and Aiken (2003). Power analyses were conducted to determine minimum sample size needed to detect small (Cohens $f^2 = .02$), medium (Cohens $f^2 = .15$), or large (Cohens $f^2 = .35$) effects, with power = .8 and $\alpha = .05$. A sample size of $n = 550$ would be required to detect a small effect, $n = 77$ to detect a medium effect, and $n = 36$ would be required to detect a large effect. Initially, researchers aimed to collect information from 77 parent-child dyads; however, due to difficulties with recruitment, 39 families' data were included in the current sample, which was sufficient to detect a large effect.

Procedures

Families were recruited through advertisements in VT Daily News, the Psychology Department web page, flyers posted to local businesses, local parenting magazines or newspapers, parenting listservs, word-of-mouth, and other local sources of parents. Additionally, mothers of children with Autism Spectrum Disorder (ASD) were simultaneously targeted to accommodate a secondary project utilizing the current study sample paradigm. As a result, ASD diagnosis was included in the preliminary correlation table to determine possible covariance. Interested mothers were contacted via phone to conduct a phone screen, answer any initial questions, review the protocol, and schedule the appointment.

The appointment took place in one of three locations: Virginia Tech Autism Clinic (Blacksburg, VA; $n = 32$), Higher Education Center (Roanoke, VA; $n = 2$), and Children's Hospital (Boston, MA; $n = 5$). A trained research assistant reviewed the consent and assent documents with the mother and child dyad and answered any questions. Then, the mother was provided the option to complete a battery of self-report questionnaires (i.e. Demographic form, Medical History form, FFMQ, PSS, PSQ-R, described in detail below) by hand or online via link to REDCap (Research Electronic Data Capture; Harris, Taylor, Thielke, Payne, Gonzalez, & Conde, 2009), a secure, web-based application designed to support data capture for research studies. During this time, the child completed activities with a research assistant in an adjacent room. The mother was taught how to place the heart-rate (HR) monitor strap around her chest and asked to perform the task while the research assistant stepped out of the room to give the participant privacy. A diagram was provided to serve as a visual aid for the mother to put on the strap. Once the device was in place and checked for proper functioning, the mother then watched a 3-minute baseline video, *National Geographic's Animal Holiday*, to achieve a "vanilla" baseline (Jennings, Kamarck, Stewart, Eddy, & Johnson, 1992). Jennings and colleagues (1992) showed that this method provided a more robust measure of baseline autonomic activity as compared to sitting quietly without a neutral, mildly engaging task. Mothers were instructed to rate their level of perceived stress using a 9-point Likert scale (i.e. 0 being not stressed at all to 8 being significantly stressed). Once this was completed, the child joined the mother in the current room. Both mother and child were seated at a table and instructed to complete a 5-minute activity-based interaction task.

More specifically, the research assistant explained that the task required the child to solve difficult puzzles with tangram pieces. The child was informed that he or she must place

geometric shapes together to form larger shapes that were outlined via templates provided.

Before leaving the room, the research assistant read the following to the mother:

“This is a test of your child’s ability. We want to see how good he/she is at thinking. After your child completes one puzzle, you can instruct him/her to move on to the next one. Most children can do the tasks on their own; however, we are giving you the answers to each puzzle as a point of reference. Do you have any questions?”

The tangram task, designed by Hudson and Rapee (2001), was created in a manner that the child would be unable to finish the task in the allocated 5-minute period due to the degree of difficulty. Mothers were provided with the answers to the puzzle in order to eliminate the confounding variable of the mothers’ ability to solve the puzzle.

After the interaction task, the mother was prompted to complete an evaluation of perceived stress and mindfulness during the task. Finally, the research assistant debriefed the mother and child, and answered any questions. The mother was asked to remove the HR monitor and the participants were thanked for their time and efforts with a small toy and ten dollars in compensation.

Self-Report Measures

Demographic Form (Appendix A). This questionnaire involved questions about the participants’ background, such as age, race, and socioeconomic status. Only mothers with a child between the ages of 7 and 12 were included in the current study.

Medical History Questionnaire (Appendix B). This self-report questionnaire was used to identify potential confounds to the measurement of HR, such as alcohol and caffeine consumption, exercise and medication.

The Five Facet Mindfulness Questionnaire (FFMQ; Appendix C). The FFMQ (Baer et al., 2006) is a 39-item self-report questionnaire that measures a general propensity towards mindfulness in daily life. The FFMQ consists of 5 subscale scores (i.e. non-reactivity to inner experience, observing, describing, acting with awareness, and non-judging of inner experience) that load onto a composite mindfulness score. Parents endorse statements on a 5-point Likert scale ranging from 1 (Never or Rarely True) to 5 (Very Often or Always True). The Non-reactivity subscale, which consists of 7 items measuring the capacity to allow feelings to come and go without getting caught up in them ($\alpha = 0.76$; e.g., “I perceive my feelings and emotions without having to react to them”), was used for the moderation analyses. In the current study, $\alpha = .77$ for Non-reactivity subscale and $.89$ for total mindfulness. The α values for the remaining subscales ranged from $.85$ to $.93$.

The State-FFMQ (S-FFMQ; *Appendix E*) consisted of a modified version of the FFMQ and was used to measure level of mother mindfulness during the parent-child interaction task. More specifically, mothers were asked to complete the questions from the non-reactivity, non-judgment and awareness sub-scales immediately following the interaction task. Questions were modified to include past verb tense and directions reminded mothers to answer according to their thoughts, feelings and experiences during the interaction task. For this current study, the α value for S-FFMQ-NR subscale was $.804$.

Perceived Stress Responsivity Scale (PSRS; Appendix D). The PSRS (Schlotz, Yim, Zoccola, Jansen, & Schulz, 2011) was adapted from the German validated Stress Reactivity Scale (SRS; Schulz, Jansen, & Schlotz, 2005) as a measure of an individual’s perception of their typical response intensity for various daily stressful situations. The PSRS consists of 23 questions that have two components: a statement that describes a potential stressful situation and

three choices describing potential responses. The PSRS produces a composite score for overall stress reactivity as well as five different subscales (i.e. Reactivity to Work Overload, Reactivity to Social Conflicts, Reactivity to Social Evaluation, Reactivity to Failure, and Prolonged Reactivity). The original study reported good internal consistency across scales ($.71 \leq \alpha \leq .91$). The revised English-version of the questionnaire demonstrated good internal consistency for total score ($\alpha = .87$) and moderate internal consistency for the scales ($.62 \leq \alpha \leq .87$). The subscale score for reactivity to social conflicts, defined as becoming emotionally affected or upset in response to social conflict or criticism, was utilized for this study to compare to autonomic responses of stress reactivity. In the current study, the Chronbach's alpha for the social conflict sub-scale was .69 and .90 for total stress reactivity. The remaining subscales ranged from .68 to .77.

Parent Feelings Questionnaire (PFQ; Appendix F). The PFQ (Deater-Deckard, 2000) consisted of 31 items rated on a 5-point Likert-type scale and measured mother report of her own negative and positive feelings toward her son or daughter. The items included statements about feelings toward the child participating in the study. For example, "Sometimes my child can really test my patience" and "I find it easy to praise and compliment my child, especially for good behavior" are questions from the negativity sub-scale (16-items) and positivity subscale (15 items) respectively. The maternal negativity scale ($\alpha = .91$ for current sample) was used as the self-reported outcome variable (i.e. indicator of negative or critical response to child).

Depression Anxiety Stress Scale- 21 (DASS-21; Appendix G). The DASS-21 (Lovibond & Lovibond, 1995) is a 21-item questionnaire that measures symptoms related to depression and anxiety on a 4-point Likert scale ranging from 0 (Did not apply to me at all) to 3 (Applied to me very much, or most of the time). The DASS-21 provides subscale scores for depression, anxiety

and stress in which higher scores indicate more affective symptoms. Internal consistencies on the scales range from .87 to .94 (Antony, Bieling, Cox, Enns, & Swinson, 1998). These measures were used to measure maternal levels of depressive, anxious and stress symptoms, which may serve as covariates to the moderation analysis. In the current study, the following Chronbach's alphas were as follows: .82 for stress, .73 for anxiety and .85 for depression.

Physiological Stress Reactivity Measurement

Reactivity to a social conflict stress response was measured via HR in mothers. Complete data were collected from 30 mothers. 9 participants were excluded because the psychophysiology equipment malfunctioned or even markers were not properly obtained. The mean baseline HR (beats per minute, bpm) was calculated during the passive viewing of a 3-minute neutral video ($M = 70.524$, $SD = 8.301$). In order to control for the individual differences of mothers' HR response at baseline, we calculated individual change scores for HR by subtracting the average resting heart rate value in beats per minute during the three minutes of baseline from the average heart rate values recorded during the entire activity-based task. This determination of stress response is consistent with previous literature on HR reactivity (e.g. Matthews, Manuck, & Saab, 1986; Larson, Ader & Moynihan, 2001). The SD of average baseline HR was compared to SD of average task HR in a paired-sample t test to test for Law of Initial Values; results demonstrated that the standard deviations were not statistically different from one another ($p = .129$), suggesting that a change score in averages of HR could be used as an unbiased predictor.

Heart rate was recorded continuously during the entirety of the tasks: 3-min baseline video and 5-min mother-child activity-based interaction task. Cardiac data was averaged to determine baseline and reactivity to stressor.

Observational/Behavioral Measure of Parent-Child Interaction

The 5-minute parent-child activity-based interaction was rated on nine global scales, previously outlined by Hudson and Rapee (2001). The nine scales represent two constructs (i.e. involvement and negativity). The Involvement factor captures the degree of help a parent provides during the task and consist of the following scales: general degree of parental involvement, degree of unsolicited help, degree to which the parent physically touches the tangram pieces, parent posture, and parent focus during task. The Negativity factor illustrates the lack of warmth during the parent-child interaction task and is comprised of the following scales: child's and parent's degree of positive affect, child's and parent's tension, child's and parent's degree of verbal and non-verbal receptiveness/criticism. For the purposes of studying the outcome of parental criticism in this study, the scale on parent verbal and non-verbal receptiveness/criticism was used to determine the quality of response a mother displays toward the child (e.g. critical or warm). Higher scores indicated more critical behaviors.

Two research assistants completed the coding of the parent-child interaction tasks using the coding system developed by Hudson and Rapee (2001). Two research assistants trained in the global coding system and coded parent-child interactions from a previous study to achieve 85% reliability before coding the videos from the current study. Each RA coded approximately two-thirds of the videos (i.e. RA1 coded 27, RA2 coded 22) and 13 were double coded (ICC = .920). Scores from the overlapping videos were averaged for the final coding responses used in the analyses. In the current study, the mean rating for level of critical response to child was 2.857 ($SD = 1.417$).

Data Analytic Strategy

Preliminary Analyses (Descriptives). Pearson correlations were calculated between self-report and observational measurements of all constructs of interest (i.e. stress reactivity, mindfulness, negative/critical response to child) to examine the relationship between self-reported levels of the behaviors and in-lab levels of the behaviors. More specifically, a self-report level of stress reactivity to social conflict was compared to change in HR to a stress inducing parent-child interaction task. Parenting response to child via self-report (i.e. level of negative feelings toward child) was compared to level of observed critical parent response to child during the interaction task. Self-report of general mindful non-reactivity was compared to self-report of mindful non-reactivity during the in-lab task. In addition, Pearson correlations were calculated among change scores in HR, average baseline HR scores, amount of caffeine intake, smoking, alcohol consumption and amount of exercise to determine possible confounds. Finally, maternal levels of anxiety, depression and stress as well as child internalizing and externalizing behaviors were calculated in zero-order correlations with all variables of interest. Significant correlations with the outcome variable were entered into the moderation analysis described below as covariates.

Hypothesis Testing. The primary hypothesis for main effects of stress reactivity (i.e. both self-report and change score in HR) and mindfulness were tested using hierarchical linear regression. Due to small sample size and sub-sequential low power, interaction terms were calculated to determine whether direction of anticipated effect was observed. All analyses were repeated for self-report levels of perceived stress reactivity to social conflict and physiological change measured by HR as the independent variables. Score on parental criticism/receptiveness during the parent-child interaction task as well as self-report measures of negative feelings toward child were used the main outcomes/dependent variables. Continuous predictors were

mean centered. All variables were screened for normality, linearity, homogeneity and multicollinearity. Post-hoc probing was then conducted with any interaction effects determined to be significant through hierarchical regression tests to determine the direction of the interaction.

Results

Preliminary Analyses

Covariates. After examining the correlations among the variables (Table 3), several covariates were included in the analyses with physiological variables and dependent variables. Because the correlation between change in HR and consumption of caffeine during the day of the session was significant, such that those mothers who consumed caffeine during the day were related to greater change in HR from baseline to task ($r = .391, p = .033$), caffeine consumption was included as a covariate for all analyses with change in HR so as to partial out HR reactivity that may have been due to caffeine consumption.

Self-report of negative feelings toward her child on the PFQ was significantly negatively correlated to child age (i.e. younger child age related to higher negative feelings; $r = -.416, p = .013$) and significantly positively correlated to maternal depression ($r = .495, p = .002$) and stress ($r = .557, p < .001$) self-report scores on the DASS (i.e. higher levels of stress and depression related to higher levels of negative feelings). As a result, regressions were conducted both with and without child age, maternal depression and maternal stress as covariates in analyses where PFQ negative feelings was the dependent variable. Behavior coding scores of mother's critical response to child during the in-lab interaction task were not significantly correlated to any variables, so no covariates were included in analyses where behavior coding was the dependent variable.

Manipulation Test of In-Lab Stressful Task. Approximately the same number of mothers reported elevated stress levels ($n = 16$) versus no change ($n = 18$) after the task, and a small proportion ($n = 3$) indicated reduced stress levels. A within-subject paired-sample t-test indicated that there was a significant difference in stress rating before and after the interaction task ($t = -3.637, p = .001$), such that there was a significant increase in reported stress overall in the current sample. Exploratory analyses showed that mothers who self-reported an increase in stress after the parent-child interaction task (i.e. measured directly before and after the task) were observed to respond to more critically to their children than mothers who either reported no change or a decrease in stress ($t = -2.65, p = .012$).

Correlations of Self-Report with In-Lab Measures

See Table 4 for a full list of correlations among all continuous variables of interest. Several correlations are of note considering the constructs of interest. Neither change in HR nor baseline HR was correlated to self-report levels of stress reactivity ($r = -.279, p = .142$; $r = .040, p = .837$) as measured by PSRS social conflict sub-scale score. Parent self-report of trait mindful non-reactivity (i.e. FFMQ-NR sub-scale) also did not correlate with parent self-reported in-lab mindful non-reactivity ($r = .110, p = .525$). Finally, neither mother self-report of negative feelings nor positive feelings toward her child, as measured by the PFQ, correlated with behavior coding of critical parent response to child during the in-lab interaction task ($r = -.103, p = .561$; $r = .031, p = .862$). In sum, results yielded no significant correlations between self-report and lab measures of similar constructs.

Hypothesis Testing¹

¹ Mediation analyses were also completed for all models as exploratory analyses; however, all models yielded non-significant results.

Model 1: Self-Report IVs Predicting Self-Report DV. The first model tested the prediction of self-report trait mindfulness (FFMQ-NR), self-report stress reactivity (PSRS-SC) and their interaction with self-reported levels of negative parent response to child (PFQ-N). First, the hierarchical linear regression was run without covariates. As shown in Table 5, PFQ-N was uniquely and positively related to PSRS-SC ($\beta = .385, p = .009$) and negatively related to FFMQ-NR ($\beta = -.398, p = .007$). These main effects remained significant with the inclusion of the interaction term in Step 2. However, the interaction term was not significant ($\beta = -.245, p = .075$). The full model accounted for 44.7% of variance in PFQ-N.

Then, the hierarchical linear regression was re-run with the following covariates: child age, mother depression and stress (DASS; see Table 6). When covariates were included in the model, the prior main effects were no longer significant. The full model accounted for 52.4% of variance in PFQ-N. In sum, significant main effects were found for self-reported stress reactivity and mindfulness on self-reported negative feelings toward the child, but these effects disappeared when child age, depression, and stress were covaried.

Model 2: Self-Report IVs Predicting In-Lab DV. The second model tested the prediction of self-report trait mindfulness (FFMQ-NR), self-report stress reactivity (PSRS-SC) and their interaction with behavioral coding of critical response to child as the outcome variable. Hierarchical linear regression was only run with predictor variables and the interaction term, as no covariates were indicated. As shown in Table 7, critical response to child was uniquely and negatively related to FFMQ-NR ($\beta = -.381, p = .041$). This main effect remained significant with the inclusion of the interaction term in Step 2. In addition, the higher-order interaction between self-reported trait mindfulness and parent stress reactivity was significant ($\beta = .370, p = .030$). The full model accounted for 27.4% of the variance in in-lab parent response to child.

Post-hoc probing was conducted with a simple slope analysis. As shown in Figure 1, the gradient slope for low stress reactivity demonstrated significant difference in levels of observed response to child based on level of mindfulness ($t = -2.817, p = .009$); however, the gradient slope for high stress reactivity did not differ significantly ($t = -.605, p = .550$). In other words, the inverse relationship between mindfulness and critical response to the child was significant only for those with low perceived stress reactivity. In sum, results indicated a significant main effect for trait mindfulness, such that more mindfulness was related to less criticism toward the child. Results also indicated a significant interaction between trait mindfulness and perceived stress reactivity, such that mindfulness predicted less criticism toward the child only in parents who reported low stress reactivity.

Model 3: In-Lab IVs Predicting Self-Report DV. The third model tested the prediction of in-lab self-report mindfulness (S-FFMQ-NR), in-lab stress reactivity (Change in HR) and their interaction with self-reported levels of negative parent response to child as the outcome. First, the hierarchical linear regression was run without covariates. As shown in Table 8, PFQ-N was not uniquely related to Change in HR ($\beta = -.342, p = .077$) or to S-FFMQ-NR ($\beta = -.032, p = .866$). These main effects remained non-significant with the inclusion of the interaction term in Step 2. The full model accounted for 13.5% of variance in PFQ-N.

Then, the hierarchical linear regression was re-run with the following covariates: child age, mother depression and stress (DASS; see Table 9). In Step 1 and Step 3, DASS-Stress was uniquely and positively related to PFQ-N ($\beta = .429, p = .043$ and $\beta = .448, p = .040$ respectively), but all main effects and the interaction remained non-significant. The full model accounted for 57.2% of variance in PFQ-N. In sum, the results yielded no significant main effects or interactions for in-lab measures on self-reported negative feelings toward the child.

Model 4: In-Lab IVs Predicting In-Lab DV. The fourth model tested the prediction of in-lab self-reported mindfulness (S-FFMQ-NR), in-lab stress reactivity (Change in HR) and their interaction on observed criticism toward the child. First, the hierarchical linear regression was run without covariates. As shown in Table 10, behavioral coding of critical response to child was not uniquely related to Change in HR ($\beta = -.142, p = .469$) or to S-FFMQ-NR ($\beta = -.117, p = .551$). These main effects remained non-significant with the inclusion of the interaction term in Step 2. The full model accounted for 3.3% of variance in behavioral coding of critical response to child.

Then, the hierarchical linear regression was re-run with the covariate of caffeine consumption. No predictors, covariates or interaction terms significantly predicted the outcome variable. The full model accounted for 4.2% of variance in behavioral coding of critical response to child. In sum, results yielded no significant main effects or interactions for in-lab measures on observed criticism toward the child.

Discussion

This study adds to the growing literature on mindful parenting by elucidating the evidence previously collected via self-report and testing the main effects of parent mindfulness and stress reactivity on response to child in an ecologically valid setting. The primary findings indicated that higher levels of self-reported mindfulness predicted lower levels of both self-reported and in-lab measurement of parent negative response to child when covariates were not included in the model. In addition, when predicting observed negative parent response to child, a significant interaction between self-reported levels of stress reactivity and trait mindfulness emerged, revealing that only mothers with low stress reactivity showed low mindfulness predicting higher critical response.

In the first set of analyses comparing parent self-report measures to in-lab measures of comparable constructs, it was anticipated the self-report measures would significantly correlate to the in-lab measurements. However, none of the self-reported sub-scales were significantly related to the in-lab counterparts. This is particularly interesting because the questions from the S-FFMQ-NR were identical to the FFMQ-NR; however, the instructions specifically stated to refer to the experiences the mother had during the interaction task with their child. One explanation for the non-converging results may relate to the importance of awareness when measuring mindful traits. More specifically, during the in-lab parent child interaction task, negative or distressing thoughts or feelings may not have arisen; as a result, responding “Never or Rarely True” to questions such as “When I had distressing thoughts or images I was able just to notice them without reacting” may better represent the non-occurrence of negative thoughts as opposed to lower levels of in-lab mindfulness. Similarly, Grossman (2008) argued that meditators might derive a different understanding of self-reported mindfulness questions when compared to non-meditators. For example, an individual who is experienced in meditation practice may automatically associate openness, non-judgment and curiosity to questions focused on paying attention to bodily sensations whereas individuals with no meditation practice may focus on the negative physical symptoms that cause distress or interference with daily life. Grossman (2011) also questioned whether individuals are able to accurately report their level of mindfulness, suggesting that individuals learning the practice of mindful meditation may be biased to respond in a particular manner to questions on mindfulness as they gain a greater understanding of the expected responses versus changes in personal experience. On the other hand, the non-significant correlation adds to the ongoing debate to best describe and measure the construct of mindfulness. While previous literature has demonstrated adequate construct validity

for the FFMQ (e.g. differences shown between meditators and non-meditators, correlations with psychological constructs, and adequate internal validity (Baer et al., 2006)), a recent study demonstrated poor discriminate validity when comparing changes in FFMQ in a group participating in MBSR to a passive control condition (i.e. waitlist group) and an active control condition (i.e. Health Enhancement Program that did not provide information about mindfulness; Goldberg et al., 2015). Although results demonstrated differences between the MBSR group and the waitlist-control group, they did not show a distinction between the MBSR group and the active control condition, suggesting that the FFMQ may not specifically tap into the construct of mindfulness but rather something broader that was taught or influenced through the active control condition and MBSR and not the waitlist control condition. In addition to recent findings, results from this current study add to the conflicting conclusions on mindfulness research, which warrants more stringent conceptualization and testing of mindfulness and the underlying facets.

Similarly, although overall ratings in stress significantly increased from before to after the task, measuring change in HR during baseline and task conditions may not have best measured a stress response in mothers. Exploratory analyses revealed higher scores in observed critical response to child for mothers who perceived the task as stress inducing and those that did not. This finding echoes the importance of simultaneously measuring an individual's perception of a stressor as well as objectively or physiologically. As posited by Abidin (1992), the appraisal of stressors contributes to parenting stress, which in turn results in parenting behaviors via several mediators (e.g., cognitive coping, social support, parenting skills competencies). It may be that mindfulness serves as an influential cognitive coping strategy, especially in the context of low stressful situations.

Anecdotally, multiple mothers indicated that they enjoyed completing the task with their son or daughter. Finally, mother report of negative feelings toward her son or daughter did not correlate to her observed level of critical response to child during the in-lab interaction task. While both indices

provided negative response to child, the self-report PFQ may have tapped more into trait emotional state while the behavior coding system captured state levels of behaviors.

In addition, the second set of analyses, which tested the main hypotheses, allowed for a greater understanding of the relationship that mindfulness plays both directly and indirectly on parenting responses to the child. As reported above, self-report mindfulness and stress reactivity predicted self-report negative feelings toward child; however, because the significance level of the main results disappeared when the covariates were entered into the model, the main effects of stress reactivity and mindfulness were appeared to be accounted for by child age and maternal depression and stress, which supports previous findings linking increased levels of maternal depression to higher levels of negative interactions with child (Cummings & Davies, 1994; Lovejoy, 1991). On the other hand, there was a significant main effect of trait mindfulness on observed parent response in the lab (i.e. high mindfulness was related to lower observed criticism) and there was an interaction with stress reactivity, such that the inverse relationship between mindfulness and observed criticism only occurred in those with less self-reported stress reactivity. The main effect of mindfulness on negative parenting behavior corroborate previous findings (Williams & Wahler, 2010); however, these significant results lie in contrast to the predictive nature of the in-lab measurements of mindfulness, as it did not predict in-lab or self-report outcome of parenting behavior to child. Because the significant results were not specific to one domain of reporting (e.g. self-report predicting self-report), mother self-report bias does not appear to play a role within the findings. Finally, it is interesting to note that the buffering response of trait mindfulness occurred as predicted, but only in the mothers with low reported stress reactivity to social conflicts, as shown in Figure 1. As such, mindfulness did not play a significant role in predicting parent response to child for those that reported higher stress reactivity. Similarly, previous findings show a weakened relationship between child behavior

and parenting traits for parents experiencing high levels of chronic stress (Deater-Deckard, Wang, Chen, & Bell, 2012), suggesting that once stress levels become high enough, previously established relationships may become obsolete as a shift in resources occurs. Interpreting the findings together, it may be imperative to target at-risk populations (i.e. those identified of increased risk for developing chronic stress) early and implement mindfulness-based treatments to effectively induce changes that may not only be beneficial to self but also children. For example, parents of children newly diagnosed with Autism Spectrum Disorder may serve as an important group to target early with mindfulness-based interventions as the current study suggests it can ameliorate critical response to child, which in turn can affect the trajectory of child outcome. Moving forward, however, it is also imperative to factor in the contribution of child behaviors (e.g. social response, disruptive behaviors, anxiety; Rezendes & Scarpa, 2011).

Overall, this study demonstrated several methodological strengths and produced multiple encouraging results. In order to decrease bias, an in-lab component to measure constructs of interest was utilized and independent researchers trained in a coding system provided a more objective measure of parenting behavior. Results from this study reveal a relationship between self-reported levels of mindfulness on observed parenting behaviors, such that higher mindfulness predicts lower levels of critical parenting response to child.

Limitations

Multiple limitations exist within the current study. As explained above, the in-lab comparisons of self-reported measures of stress-reactivity, mindfulness and parent response to child may not have tapped into the same constructs of interest. This may be the result of targeting incompatible state and trait constructs; however, it may also be a result of study design. Selecting a more naturalistic stress-inducing task may have increased the variability and range of observed

parent stress. Similarly, although there was variability within observed parent response to child, the mean behavioral rating was 2.857, which corresponds to behaviors that are moderately encouraging. Codes below 4 indicated a general positive response to child and codes greater than 4 corresponded with responses critical in nature. 85.7% of the behavioral codes for critical response to child were coded as 4 or below, demonstrating that a majority of responses were overall positive in nature.

The inclusion of typically developing children presented two limitations. As discussed above, many children in the current study found the task challenging but did not demonstrate high levels of frustration, which in turn did not appear to stress the mothers. As shown in Table 3, child internal and external behavioral difficulties did not correlate with dependent variables. Secondly, difficulty with recruitment for typically developing children was evidenced. As a result, conclusions from the regression models must be viewed with caution due to the small sample size included in the current study.

Finally, while parent-report measures of internalizing and externalizing behaviors of children were collected and screened for covariance, a measure of in-lab child disruptive behavior was not used in the current analyses. Future analyses should control for and analyze the differences child behavior factors into parenting response. Even though this study focused on the direction of parent stress on parenting behavior to child, the child's behavior could also serve as an important antecedent and reinforcer of such parenting behaviors.

Future Directions

Future directions include continued rigorous investigation of the in-lab comparison of self-reported measures of parent stress reactivity, mindfulness and response to child. Analyzing parent stress response via other physiological measurements including electro-dermal activity

(EDA), cortisol, and heart rate variability (HRV) would allow greater insight into the sympathetic, parasympathetic and HPA influence during stressful situations. It may also be helpful to measure stress responses in multiple contexts (e.g. cold-pressor task to measure overall levels vs. stress related to interacting with child during challenging task) to examine the importance of differentiating state and trait features of stress response. Additionally, a behavioral observation of mindfulness may help provide clarity with the non-significant correlations between self-reported levels of mindfulness before and during the task. Furthermore, investigating the top-down versus bottom-up mechanistic approach of mindfulness (e.g. reactivity versus regulation) may yield valuable information in the context of stress appraisal. More specifically, previous literature supports the relationship between mindfulness meditation and executive control, mediated by emotional acceptance (Kirk, Downar, & Montague, 2011; Teper & Inzlicht, 2013). Future studies should continue to delineate the mechanisms that link mindfulness to parenting response to child.

Overall, this study demonstrates the importance of collecting and comparing self-report and objective measures of interest. The findings from this study add to the literature on mindfulness and stress within the context of parent and child interaction. Results demonstrate that mindfulness may play an important role in predicting lower critical response to child, especially for mothers who self-report low levels of stress reactivity. However, due to low sample size and subsequent low power, results should be viewed with caution.

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Table 1
Descriptive Statistics for Continuous Variables of Interest

Measure	n	Minimum	Maximum	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
Demographics							
Mother Age (years)	33	31.00	49.00	39.242	4.937	.407	-.908
Child Age (years)	36	7.00	12.00	8.778	1.456	.469	-.466
Mother Height (in cm)	34	155.00	185.00	166.103	5.939	1.067	2.295
Mother Weight (pounds)	34	103.00	257.00	152.324	33.322	1.147	1.649
Mean Baseline HR	30	52.296	91.455	70.524	8.301	.105	.307
Mean Task HR	30	55.337	93.054	74.987	10.110	-.044	-.737
Change in HR	30	-5.07	13.85	4.463	3.956	.080	1.067
Primary Measures							
PSRS-SC	38	1.00	10.00	5.895	2.090	-.359	.172
PSRS-Total	38	3.00	40.00	22.211	8.559	-.250	-.311
FFMQ-NR	38	11.00	31.00	22.711	3.897	-.134	1.55
FFMQ-Total	38	97.00	166.00	132.684	15.153	-.126	.266
PFQ-P	38	38.00	55.00	49.290	4.538	-.813	.257
PFQ-N	38	17.00	60.00	40.342	11.732	-.604	-.471
S-FFMQ-NR	37	7.00	35.00	24.135	5.870	-.513	.527
Response to Child	35	.00	6.00	2.857	1.417	.004	-.523
Secondary Measures/Confounds							
SDQ Internalizing	38	.00	16.00	6.211	4.121	.299	-.635
SDQ Externalizing	38	.00	17.00	7.079	4.750	.506	-.729
DASS Stress	38	.00	32.00	10.684	7.208	.683	.778
DASS Depression	38	.00	20.00	4.316	5.493	1.413	1.246
DASS Anxiety	38	.00	14.00	3.351	3.773	1.12	.604

Note. PSRS-SC = Perceived Stress Reactivity Scale Social Conflict subscale; PSRS-Total = Perceived Stress Reactivity Scale total score; FFMQ-NR = Five Facet Mindfulness Questionnaire Nonreactivity subscale; FFMQ-Total = Five Facet Mindfulness Questionnaire total score; PFQ-P = Parent Feelings Questionnaire Positivity subscale; PFQ-N = Parent Feelings Questionnaire Negativity subscale; S-FFMQ-NR = Adapted State Five Facet Mindfulness Questionnaire Nonreactivity subscale; SDQ = Strengths and Difficulties Questionnaire; DASS = Depression Anxiety Stress Scale

Table 2
Descriptive Statistics for Categorical Variables of Interest

Variable	Percentage (n)
Child Gender	
Male	64.1 (25)
Female	30.8 (12)
Location	
Blacksburg	82.1 (32)
Roanoke	5.1 (2)
Boston	12.8 (5)
Child ASD Dx	
Yes	34.2 (13)
No	65.8 (25)
Practice Meditation?	
Yes	30.8 (12)
No	61.5 (24)
Mother Ethnicity	
Asian	17.1 (6)
Caucasian	74.4 (29)
Child Ethnicity	
African American	2.6 (1)
Asian	17.9 (7)
Caucasian	64.1 (25)
Hispanic	2.6 (1)
Approximate Yearly Household Income	
\$10,000-\$25,000	2.6 (1)
\$25,000-\$50,000	25.6 (10)
\$50,000-\$75,000	23.1 (9)
\$75,000-\$100,000	15.4 (6)
\$100,000-\$200,000	20.5 (8)
\$200,000+	7.7 (3)
Did not report	5.1 (2)
Marital Status	
Divorced	12.8 (5)
Married	74.4 (29)
Remarried	5.1 (2)
Separated	2.6 (1)
Unmarried/In a relationship	5.1 (2)
Highest Level of Schooling Completed	
Some college	20.5 (8)
Bachelors/4-year degree	33.3 (13)
Graduate School	41.0 (16)
Manipulation Check (Stress of Task)	
-1 (decrease)	7.7 (3)
0 (no change)	46.2 (18)
+1 (increase)	17.9 (7)
+2 (increase)	15.4 (6)
+3 (increase)	5.1 (2)
+4 (increase)	2.6 (1)

Table 3
Correlations Among HR Variables and Possible Covariates

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Change in HR	1												
2. Baseline HR	.269	1											
3. Task HR	.612**	.926**	1										
4. Mother Age	-.022	-.471*	-.397*	1									
5. Mother Height (cm)	.013	.226	.192	-.297	1								
6. Mother Weight (lbs)	.029	.333	.286	-.360	.377*	1							
7. Current Medication (Y/N)	-.254	-.011	-.108	.031	-.202	-.090	1						
8. Current Dx (Y/N)	.120	-.228	-.140	.223	.232	-.033	-.402*	1					
9. Caffeine Today? (Y/N)	.391*	.002	.154	.035	.091	.236	-.078	-.147	1				
10. Exercise Today? (Y/N)	-.023	-.247	-.212	.014	.205	-.208	-.081	-.241	.123	1			
11. Regular Exercise (Y/N)	-.097	-.383*	-.353	.142	-.088	-.610**	.139	.098	.062	.105	1		
12. Meditation (Y/N)	-.288	.059	-.064	-.153	-.033	-.165	.248	-.250	-.204	.118	.136	1	
13. BMI	.034	.322	.280	-.310	.084	.953**	-.025	-.115	.225	-.284	-.631**	-.180	1

Note. HR = heart rate; BMI = body mass index; * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4
Pearson Moment Correlations for All Variables of Interest

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	
Demographic Variables	1. Parent age	1									
	2. Child gender	.103	1								
	3. Child age	.291	.439**	1							
	4. ASD Child Dx	.097	-.026	.036	1						
	5. Meditation	-.153	-.061	-.032	-.213	1					
Stress Reactivity Variables	6. Baseline HR	-.471*	-.015	.065	-.162	.059	1				
	7. Change in HR	-.022	.079	.045	-.254	-.288	.269	1			
	8. PSRS-SC	-.380*	-.173	-.502**	-.112	.190	.040	-.279	1		
	9. PSRS-Total	-.420*	-.151	-.448**	-.050	.214	.028	-.340	.819**	1	
Mindfulness Variables	10. S-FFMQ-NR	.128	.228	.168	-.056	.172	.015	-.072	-.159	-.100	1
	11. FFMQ-NR	.100	.348*	.315	.125	-.055	.088	.300	-.256	-.461**	.110
	12. FFMQ-Total	.096	.188	.335*	-.196	.112	.153	.191	-.193	-.540**	.131
Parent Response Variables	13. Parent Response	.172	-.116	.158	.047	-.009	-.070	-.135	-.200	-.140	-.071
	14. PFQ-N	-.081	-.174	-.416*	-.004	.038	-.125	-.338	.474**	.611**	0.87
	15. PFQ-P	.020	.148	.221	.035	.188	.029	-.004	-.230	-.290	-.054
Confounding Variables	16. DASS Depression	-.165	.079	-.295	.093	-.016	.083	-.013	.427**	.613**	.083
	17. DASS Anxiety	-.206	-.202	-.300	-.205	-.001	.336	-.080	.355*	.451**	-.273
	18. DASS Stress	-.244	-.128	-.342*	-.063	.163	.136	-.219	.536**	.758**	-.184
	19. SDQ Internalizing	-.023	-.263	-.295	.499**	-.041	-.012	-.238	.156	.172	.308
	20. SDQ Externalizing	-.116	-.171	-.313	.487*	-.172	.150	-.095	.295	.160	-.164

Note. HR = Heart Rate; PSRS-SC = Perceived Stress Reactivity Scale Social Conflict subscale; PSRS-Total = Perceived Stress Reactivity Scale total score; FFMQ-NR = Five Facet Mindfulness Questionnaire Nonreactivity subscale; FFMQ-Total = Five Facet Mindfulness Questionnaire total score; PFQ-P = Parent Feelings Questionnaire Positivity subscale; PFQ-N = Parent Feelings Questionnaire Negativity subscale; S-FFMQ-NR = Adapted State Five Facet Mindfulness Questionnaire Nonreactivity subscale; SDQ = Strengths and Difficulties Questionnaire; DASS = Depression Anxiety Stress Scale; * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4 (cont.)
Pearson Moment Correlations for All Variables of Interest

		11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
Demographic	1. Parent age										
Variables	2. Child gender										
	3. Child age										
	4. ASD Child Dx										
	5. Meditation										
Stress	6. Baseline HR										
Reactivity	7. Change in HR										
Variables	8. PSRS Social										
	9. PSRS Total										
Mindfulness	10. S-FFMQ-NR										
Variables	11. FFMQ-NR	1									
	12. FFMQ-Total	.659**	1								
Parent	13. Parent Response	-.302	-.369*	1							
Response	14. PFQ Neg	-.503**	-.502**	-.103	1						
Variables	15. PFQ Pos	.376*	.372*	.031	-.631**	1					
Confounding	16. DASS: Depression	-.372*	-.483**	-.051	.495**	-.325*	1				
Variables	17. DASS: Anxiety	-.386*	-.377*	.132	.155	-.105	.339*	1			
	18. DASS: Stress	-.470**	-.517**	.009	.557*	-.264	.609**	.568**	1		
	19. SDQ-Internalizing	-.181	-.292	.128	.229	-.165	.420**	.098	.275	1	
	20. SDQ-Externalizing	-.021	-.161	.071	.312	-.222	.310	.250	.325*	.645**	1

Note. HR = Heart Rate; PSRS-SC = Perceived Stress Reactivity Scale Social Conflict subscale; PSRS-Total = Perceived Stress Reactivity Scale total score; FFMQ-NR = Five Facet Mindfulness Questionnaire Nonreactivity subscale; FFMQ-Total = Five Facet Mindfulness Questionnaire total score; PFQ-P = Parent Feelings Questionnaire Positivity subscale; PFQ-N = Parent Feelings Questionnaire Negativity subscale; S-FFMQ-NR = Adapted State Five Facet Mindfulness Questionnaire Nonreactivity subscale; SDQ = Strengths and Difficulties Questionnaire; DASS = Depression Anxiety Stress Scale; * $p < .05$, ** $p < .01$, *** $p < .001$

Table 5

Hierarchical Linear Regression: Model 1 without Covariates (N=37)

Variable	<i>B</i>	<i>SE</i>	<i>Beta</i>	R ² Change	<i>F</i> Change
Outcome: PFQ-Negativity					
Step 1				.390	10.887***
PSRS-SC	2.284	.827	.385**		
FFMQ-NR	-1.198	.419	-.398**		
Step 2				.057	3.372
PSRS-SC	2.630	.822	.443**		
FFMQ-NR	-1.207	.405	-.401**		
PSRS-SCxFFMQ-NR	-.354	.193	-.245		

Note. PSRS-SC = Perceived Stress Reactivity Scale Social Conflict subscale; FFMQ-NR = Five Facet Mindfulness Questionnaire Nonreactivity subscale; **p* < .05, ***p* < .01, ****p* < .001

Table 6
Hierarchical Linear Regression: Model 1 with Covariates (N=33)

Variable	<i>B</i>	<i>SE</i>	Beta	R ² Change	<i>F</i> Change
Outcome: PFQ-Negativity					
Step 1				.405	6.797**
Child Age	-2.101	1.207	-.260		
DASS Depression	.646	.383	.300		
DASS Stress	.417	.291	.261		
Step 2				.064	1.672
Child Age	-1.190	1.293	-.147		
DASS Depression	.522	.381	.243		
DASS Stress	.185	.313	.115		
PSRS-SC	1.290	1.037	.221		
FFMQ-NR	-.637	.466	-.218		
Step 3				.056	3.161
Child Age	-1.938	1.314	-.240		
DASS Depression	.383	.375	.178		
DASS Stress	.099	.306	.062		
PSRS-SC	1.667	1.022	.285		
FFMQ-NR	-.697	.450	-.238		
PSRS-SCxFFMQ-NR	-.370	.208	-.269		

Note. DASS = Depression Anxiety Stress Scale; PSRS-SC = Perceived Stress Reactivity Scale Social Conflict subscale; FFMQ-NR = Five Facet Mindfulness Questionnaire Nonreactivity subscale; **p* < .05, ***p* < .01, ****p* < .001

Table 7

Hierarchical Linear Regression: Model 2 without Covariates (N=32)

Variable	<i>B</i>	<i>SE</i>	Beta	R ² Change	<i>F</i> Change
Outcome: Parent Response to Child (Behavior Code)					
Step 1					
PSRS-SC	-.158	.123	-.230		
FFMQ-NR	-.131	.061	-.381*		
Step 2					
PSRS-SC	-.207	.117	-.300		
FFMQ-NR	-.126	.058	-.365*		
PSRS-SCxFFMQ-NR	.060	.026	.370*		

Note. PSRS-SC = Perceived Stress Reactivity Scale Social Conflict subscale; FFMQ-NR = Five Facet Mindfulness Questionnaire Nonreactivity subscale; * $p < .05$, ** $p < .01$, *** $p < .001$

Table 8

Hierarchical Linear Regression: Model 3 without Covariates (N=28)

Variable	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>R</i> ² Change	<i>F</i> Change
Outcome: PFQ-Negativity					
Step 1				.115	1.696
ΔHR	-.975	.530	-.342		
SFFMQ-NR	-.055	.321	-.032		
Step 2				.019	.554
ΔHR	-.021	1.390	-.007		
SFFMQ-NR	-.060	.324	-.035		
ΔHRxSFFMQ-NR	.076	.102	.363		

Note. ΔHR = Change in heart rate; SFFMQ-NR = Adapted State Five Facet Mindfulness Questionnaire Nonreactivity subscale; **p* < .05, ***p* < .01, ****p* < .001

Table 9
Hierarchical Linear Regression: Model 3 with Covariates (N=27)

Variable	B	SE	Beta	R ² Change	F Change
Outcome: PFQ-Negativity					
Step 1				.460	4.899**
Child Age	-1.396	1.302	-.200		
DASS: Depression	.322	.400	.171		
DASS: Stress	.624	.292	.429*		
Caffeine Today?	-3.793	4.244	-.161		
Step 2				.035	.738
Child Age	-1.817	1.369	-.260		
DASS: Depression	.220	.422	.116		
DASS: Stress	.622	.314	.427		
Caffeine Today?	-1.956	4.650	-.083		
ΔHR	-.411	.504	-.144		
SFFMQ-NR	.213	.290	.125		
Step 3				.077	3.587
Child Age	-2.668	1.368	-.382		
DASS: Depression	.079	.405	.042		
DASS: Stress	.652	.297	.448*		
Caffeine Today?	.243	4.539	.010		
ΔHR	1.612	1.169	.564		
SFFMQ-NR	.251	.275	.148		
ΔHRxSFFMQ-NR	.162	.086	.784		

Note. DASS = Depression Anxiety Stress Scale; ΔHR = Change in heart rate; SFFMQ-NR = Adapted State Five Facet Mindfulness Questionnaire Nonreactivity subscale; * $p < .05$, ** $p < .01$, *** $p < .001$

Table 10

Hierarchical Linear Regression: Model 4 without Covariates (N=28)

Variable	<i>B</i>	<i>SE</i>	Beta	R ² Change	<i>F</i> Change
Outcome: Parent Response to Child (Behavior Code)					
Step 1				.032	.428
ΔHR	-.048	.066	-.142		
SFFMQ-NR	-.025	.041	-.117		
Step 2				.001	.020
ΔHR	-.073	.185	-.215		
SFFMQ-NR	-.025	.041	-.117		
ΔHRxSFFMQ-NR	-.002	.013	-.078		

Note. ΔHR = Change in heart rate; SFFMQ-NR = Adapted State Five Facet Mindfulness Questionnaire Nonreactivity subscale; * $p < .05$, ** $p < .01$, *** $p < .001$

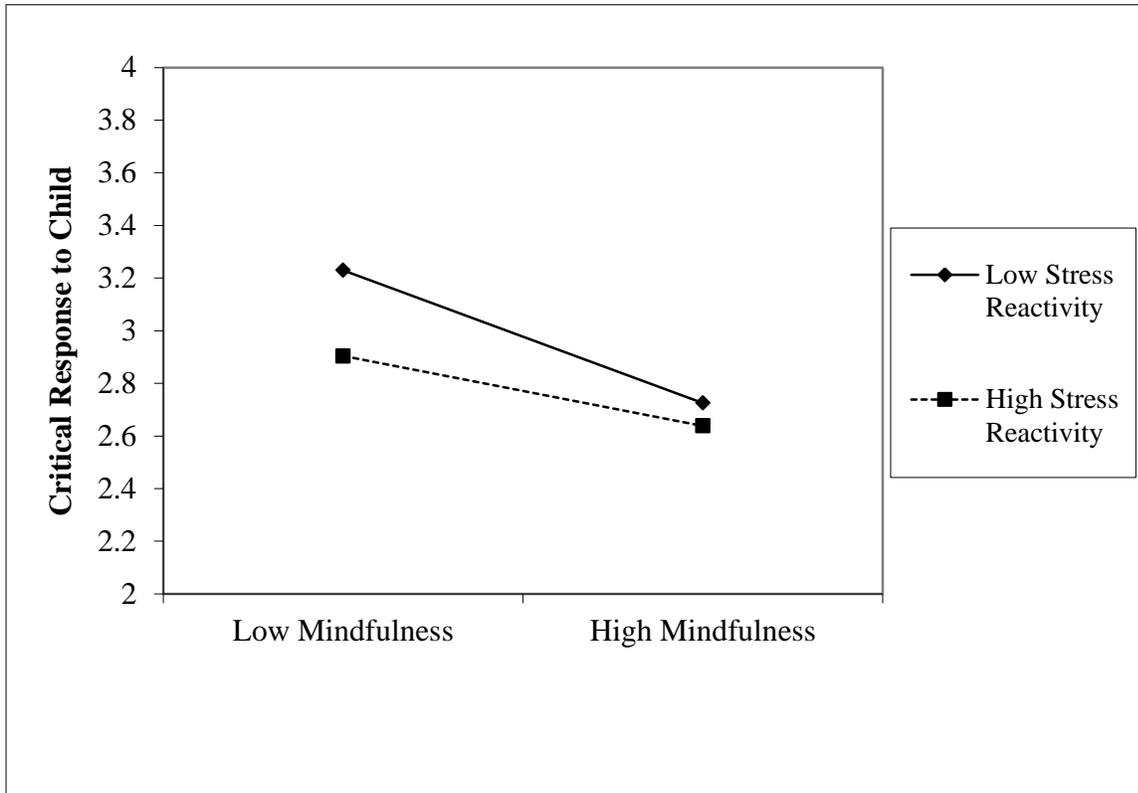
Table 11

Hierarchical Linear Regression: Model 4 with Covariates (N=28)

Variable	<i>B</i>	<i>SE</i>	Beta	R ² Change	<i>F</i> Change
Outcome: Parent Response to Child (Behavior Code)					
Step 1				.025	.679
Consume Caffeine	-.444	.539	-.157		
Step 2				.016	.206
Consume Caffeine	-.293	.623	-.103		
ΔHR	-.033	.074	-.097		
SFFMQ-NR	-.021	.042	-.102		
Step 3				.002	.042
Consume Caffeine	-.311	.641	-.110		
ΔHR	-.068	.189	-.201		
SFFMQ-NR	-.021	.042	-.102		
ΔHRxSFFMQ-NR	-.003	.014	-.114		

Note. ΔHR = Change in heart rate; SFFMQ-NR = Adapted State Five Facet Mindfulness Questionnaire Nonreactivity subscale; * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 1
Graphical Representation of Model 2



Appendix A

DEMOGRAPHICS QUESTIONNAIRE

1. Today's date (mm/dd/yyyy): _____

2. What is your age? _____ years

3. What is your month and year of birth? _____

4. Which of the following best describes your ethnicity/ race?

Caucasian

African-American

Hispanic

Asian

Other (please specify): _____

5. Marital Status:

Married

Long-term relationship

Divorced or Separated

Single or Never married

Widowed

6. What is your approximate yearly household income?

less than \$10,000

\$10,000- \$25, 000

\$25,000 - \$50000

\$50,000 - \$75,000

\$75,000 - \$99,999

\$100,000 - \$199,999

\$200,000 or more

7. How many total persons live in your household? _____

8. Please complete the following table and STAR the child who will be participating in today's study:

	Relationship to you	Gender	Age
Example	<i>Son (biological)*</i>	<i>Male</i>	<i>7</i>
1			
2			
3			
4			
5			
6			

9. Which of the following best describes your child's ethnicity/ race?

- Caucasian
- African-American
- Hispanic
- Asian
- Other (please specify): _____

10. What level of education has your child completed?

- None
- Preschool
- Elementary School
- Middle School

11. Specify last grade completed: _____

12. Does your child have any other symptoms or diagnoses? (check all that apply)

- Anxiety Disorder
- Autism Spectrum Disorder
- Attention Deficit Hyperactive Disorder
- Obsessive Compulsive Disorder
- Central Auditory Processing Disorder
- Depression
- Schizophrenia
- Hearing Impairment
- Vision Impairment
- 'Tunnel Vision Syndrome' (peripheral vision, vision perception impairment)
- Mental Retardation
- Seizures
- Dietary Allergies
- Digestive Problems (constipation, diarrhea, bloating, or abdominal pain)
- None
- Other (please specify): _____

Appendix B

MEDICAL HISTORY QUESTIONNAIRE

1) Have you eaten today? No Yes

1a) If yes, what have you eaten today?

1b) If yes, what time did you last eat? _____

2) Have you consume caffeinated beverages today? No Yes

2a) If yes, what caffeinated beverages did you have today?

2b) If yes, what time did you have these beverages? _____

3) Have you consume any alcoholic beverages today? No Yes

3a) If yes, what alcoholic beverages did you have today?

3b) If yes, what time did you have these beverages? _____

4) Have you smoked cigarettes or another tobacco product today? No Yes

4a) If yes, what tobacco product did you use?

4b) If yes, what time did you last use the tobacco product? _____

5) Have you exercised today? No Yes

5a) If yes, what exercise activities did you do today?

5b) If yes, what time did you exercise? _____

6) Do you regularly engage in exercise? No Yes

6a) If yes, how much and how often do you exercise?

6b) If yes, what types of activities do you engage in?

7) Do you currently participate in meditation? No Yes

7a) If yes, how much and how often do you meditate?

8) What time did you fall asleep last night? _____

9) What time did you wake up this morning? _____

10) Do you have any of the following medical conditions?

- Heart condition? No Yes
- Low blood pressure No Yes
- High blood pressure No Yes
- Fainting spells or dizziness No Yes
- Diabetes No Yes
- Asthma No Yes
- Neurological disorders No Yes
- Other condition (s) _____

10a) If yes to any of the items in #10, please explain and describe in more detail:

11) Are you currently taking any medications? No Yes

12a) If yes, what? How much? Why?

12) Do you have any known allergies? No Yes

12a) If yes, what allergies do you have? Please be specific.

13) Are you allergic to any food? No Yes

13a) If yes, what food are you allergic to? Please be specific.

14) Have you ever had a head injury? No Yes

14a) If yes, please explain.

15) Have you ever been knocked unconscious for longer than 5 minutes? No Yes

15a) If yes, please explain.

Appendix C

FIVE FACE MINDFULNESS QUESTIONNAIRE

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

- | 1 | 2 | 3 | 4 | 5 |
|---------------------|-------------|----------------|------------|----------------------|
| or very rarely true | Rarely true | sometimes true | Often true | often or always true |
-
- _____ 1. When I'm walking, I deliberately notice the sensations of my body moving.
 - _____ 2. I'm good at finding words to describe my feelings.
 - _____ 3. I criticize myself for having irrational or inappropriate emotions.
 - _____ 4. I perceive my feelings and emotions without having to react to them.
 - _____ 5. When I do things, my mind wanders off and I'm easily distracted.
 - _____ 6. When I take a shower or bath, I stay alert to the sensations of water on my body.
 - _____ 7. I can easily put my beliefs, opinions, and expectations into words.
 - _____ 8. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.
 - _____ 9. I watch my feelings without getting lost in them.
 - _____ 10. I tell myself I shouldn't be feeling the way I'm feeling.
 - _____ 11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.
 - _____ 12. It's hard for me to find the words to describe what I'm thinking.
 - _____ 13. I am easily distracted.
 - _____ 14. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.
 - _____ 15. I pay attention to sensations, such as the wind in my hair or sun on my face.
 - _____ 16. I have trouble thinking of the right words to express how I feel about things.
 - _____ 17. I make judgments about whether my thoughts are good or bad.
 - _____ 18. I find it difficult to stay focused on what's happening in the present.
 - _____ 19. When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it.
 - _____ 20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
 - _____ 21. In difficult situations, I can pause without immediately reacting.
 - _____ 22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.
 - _____ 23. It seems I am "running on automatic" without much awareness of what I'm doing.
 - _____ 24. When I have distressing thoughts or images, I feel calm soon after.
 - _____ 25. I tell myself that I shouldn't be thinking the way I'm thinking.
 - _____ 26. I notice the smells and aromas of things.
 - _____ 27. Even when I'm feeling terribly upset, I can find a way to put it into words.
 - _____ 28. I rush through activities without being really attentive to them.
 - _____ 29. When I have distressing thoughts or images I am able just to notice them without reacting.
 - _____ 30. I think some of my emotions are bad or inappropriate and I shouldn't feel them.
 - _____ 31. I notice visual elements in nature, such as colors, shapes, textures, or patterns of light and shadow.
 - _____ 32. My natural tendency is to put my experiences into words.
 - _____ 33. When I have distressing thoughts or images, I just notice them and let them go.
 - _____ 34. I do jobs or tasks automatically without being aware of what I'm doing.
 - _____ 35. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about.
 - _____ 36. I pay attention to how my emotions affect my thoughts and behavior.
 - _____ 37. I can usually describe how I feel at the moment in considerable detail.
 - _____ 38. I find myself doing things without paying attention.
 - _____ 39. I disapprove of myself when I have irrational ideas.

Appendix D

PERCEIVED STRESS REACTIVITY SCALE

Instructions: This questionnaire asks about your reactions to situations which you may have experienced in the past. Three answers are suggested. Please indicate the answer that most closely describes your own reaction in general. Please don't skip any item, even if it may be hard to find the best answer.

1. When tasks and duties build up to the extent that they are hard to manage...

- I am generally untroubled
- I usually feel a little uneasy
- I normally get quite nervous

2. When I want to relax after a hard day at work . . .

- This is usually quite difficult for me
- I usually succeed
- I generally have no problem at all

3. When I have conflicts with others that may not be immediately resolved...

- I generally shrug it off
- It usually affects me a little
- It usually affects me a lot

4. When I make a mistake...

- In general, I remain confident
- I sometimes feel unsure about my abilities
- I often have doubts about my abilities

5. When I'm wrongly criticized by others...

- I am normally annoyed for a long time
- I am annoyed for just a short time
- In general, I am hardly annoyed at all

6. When I argue with other people...

- I usually calm down quickly
- I usually stay upset for some time
- It usually takes me a long time until I calm down

7. When I have little time for a job to be done...

- I usually stay calm
- I usually feel uneasy
- I usually get quite agitated

8. When I make a mistake...

- I am normally annoyed for a long time
- I am normally annoyed for a while
- I generally get over it easily

9. When I am unsure what to do or say in a social situation...
- I generally stay cool
 - I often feel warm
 - I often begin to sweat
10. When I have spare time after working hard...
- It often is difficult for me to unwind and relax
 - I usually need some time to unwind properly
 - I am usually able to unwind effectively and forget about the problems of the day
11. When I am criticized by others...
- Important arguments usually come to my mind when it is too late to still make my point
 - I often have difficulty finding a good reply
 - I usually think of a reply to defend myself
12. When something does not go the way I expected...
- I usually stay calm
 - I often get uneasy
 - I usually get very agitated
13. When I do not attain a goal...
- I usually remain annoyed for a long time
 - I am usually disappointed, but recover soon
 - In general, I am hardly concerned at all
14. When others criticize me...
- I generally don't lose confidence at all
 - I generally lose a little confidence
 - I generally feel very unconfident
15. When I fail at something...
- I usually find it hard to accept
 - I usually accept it to some degree
 - In general, I hardly think about it
16. When there are too many demands on me at the same time...
- I generally stay calm and do one thing after the other
 - I usually get uneasy
 - Usually, even minor interruptions irritate me
17. When others say something incorrect about me . . .
- I usually get quite upset
 - I normally get a little bit upset
 - In general, I shrug it off

18. When I fail at a task...

- I usually feel very uncomfortable
- I usually feel somewhat uncomfortable
- In general, I don't mind

19. When I argue with others...

- I usually get very upset
- I usually get a little bit upset
- I usually don't get upset

20. When I am under stress...

- I usually can't enjoy my leisure time at all
- I usually have difficulty enjoying my leisure time
- I usually enjoy my leisure time

21. When tasks and duties accumulate to the extent that they are hard to cope with...

- My sleep is unaffected
- My sleep is slightly disturbed
- My sleep is very disturbed

22. When I have to speak in front of other people...

- I often get very nervous
- I often get somewhat nervous
- In general, I stay calm

23. When I have many tasks and duties to fulfill...

- In general, I stay calm
- I usually get impatient
- I often get irritable

Appendix E

FIVE FACE MINDFULNESS QUESTIONNAIRE - State

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is true for you during the interaction you just completed with your child.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Often true	Very often or always true

- _____ 1. I criticized myself for having irrational or inappropriate emotions.
- _____ 2. I perceived my feelings and emotions without having to react to them.
- _____ 3. When I did things, my mind wandered off and I was easily distracted.
- _____ 4. I didn't pay attention to what I was doing because I was daydreaming, worrying, or otherwise distracted.
- _____ 5. I watched my feelings without getting lost in them.
- _____ 6. I told myself I shouldn't be feeling the way I'm feeling.
- _____ 7. I was easily distracted.
- _____ 8. I believed some of my thoughts were abnormal or bad and that I shouldn't think that way.
- _____ 9. I made judgments about whether my thoughts were good or bad.
- _____ 10. I found it difficult to stay focused on what was happening in the present.
- _____ 11. When I had distressing thoughts or images, I "stepped back" and was aware of the thought or image without getting taken over by it.
- _____ 12. In difficult moments, I could pause without immediately reacting.
- _____ 13. It seemed like I was "running on automatic" without much awareness of what I was doing.
- _____ 14. When I had distressing thoughts or images, I felt calm soon after.
- _____ 15. I told myself that I shouldn't be thinking the way I was thinking.
- _____ 16. I noticed the smells and aromas of things.
- _____ 17. I rushed through the activity without being really attentive to it.
- _____ 18. When I had distressing thoughts or images I was able just to notice them without reacting.
- _____ 19. I thought some of my emotions were bad or inappropriate and that I shouldn't feel them.
- _____ 20. When I had distressing thoughts or images, I just noticed them and let them go.
- _____ 21. I did the task automatically without being aware of what I'm doing.
- _____ 22. When I had distressing thoughts or images, I judged myself as good or bad, depending what the thought/image was about.
- _____ 23. I found myself doing things without paying attention.
- _____ 24. I disapproved of myself when I have irrational ideas.

Appendix F

PARENT FEELINGS QUESTIONNAIRE

Parent Feelings Questionnaire (Deater-Deckard, 2000)

Every parent experiences both positive and negative feelings toward his or her child. Listed below are statements describing some of these feelings that parents may experience. Read each statement carefully and circle the number that most closely reflects your feelings toward your child: **1 = definitely untrue for you**, to **5 = definitely true for you**. Try to provide an answer for each item without skipping or looking back.

Think about your child, and use this scale when circling the appropriate number for each item:

1	2	3	4	5
Definitely untrue for me	Somewhat untrue for me	Not really true for me	Somewhat true for me	Definitely true for me
I usually make an effort to praise my child for good behavior.				1 2 3 4 5
Sometimes I am not happy about my relationship with my child.				1 2 3 4 5
Every once in a while my child's behavior can bring out the worst in me.				1 2 3 4 5
Every once in a while I avoid talking or playing with my child, such as when I am angry with her/him				1 2 3 4 5
I enjoy hugging and cuddling with my child.				1 2 3 4 5
Sometimes I find it difficult to be around my child.				1 2 3 4 5
My child and I do not get along as I had hoped we would.				1 2 3 4 5
Most of the time, my child brings out the best in me.				1 2 3 4 5
Sometimes I do not enjoy being with my child.				1 2 3 4 5
My child and I fight or argue more than I would like to.				1 2 3 4 5
I enjoy being my child's parent.				1 2 3 4 5
Every once in a while I wish that my child would just go away for a few minutes.				1 2 3 4 5
Sometimes my child's behavior makes me so angry I can barely stand it.				1 2 3 4 5
Being around my child is more enjoyable than I ever thought it would be.				1 2 3 4 5
Every once in a while I feel some resentment toward my child.				1 2 3 4 5
Sometimes I do not get along well with my child.				1 2 3 4 5
I am usually affectionate with my child.				1 2 3 4 5
I find it easy to praise and compliment my child, especially for good behavior.				1 2 3 4 5
Sometimes I do not enjoy spending time alone with my child.				1 2 3 4 5
Sometimes I find it difficult to communicate with my child.				1 2 3 4 5
When I think about my child, it usually gives me warm feelings.				1 2 3 4 5
Sometimes I raise my voice with my child, especially after I've had a bad day.				1 2 3 4 5
Sometimes my child can really test my patience.				1 2 3 4 5
I usually feel quite happy about my relationship with my child.				1 2 3 4 5

Parents experience a wide variety of emotions with respect to their children. Using a 10-point scale (1=**NEVER** TO 10=**ALWAYS**), rate how frequently, on average, you experience these emotions when you are with your child.

(circle number)	<u>never</u>	<u>always</u>
Happy	1 2 3 4 5 6 7 8 9 10	
Sad	1 2 3 4 5 6 7 8 9 10	
Angry	1 2 3 4 5 6 7 8 9 10	
Excited	1 2 3 4 5 6 7 8 9 10	
Hostile	1 2 3 4 5 6 7 8 9 10	
Joyful	1 2 3 4 5 6 7 8 9 10	
Frustrated	1 2 3 4 5 6 7 8 9 10	
Proud	1 2 3 4 5 6 7 8 9 10	
Furious	1 2 3 4 5 6 7 8 9 10	
Amused	1 2 3 4 5 6 7 8 9 10	

Appendix G

DEPRESSION ANXIETY STRESS SCALE-21

Please read each statement and circle a number 0, 1, 2 or 3 that indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

- 0 Did not apply to me at all
- 1 Applied to me to some degree, or some of the time
- 2 Applied to me to a considerable degree, or a good part of time
- 3 Applied to me very much, or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (e.g., in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

Appendix H

STRENGTH AND DIFFICULTY QUESTIONNAIRE

Strengths and Difficulties Questionnaire

P or T⁴⁻¹⁰

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain. Please give your answers on the basis of the child's behavior over the last six months or this school year.

Child's name

Male/Female

Date of birth.....

	Not True	Somewhat True	Certainly True
Considerate of other people's feelings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Restless, overactive, cannot stay still for long	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often complains of headaches, stomach-aches or sickness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shares readily with other children, for example toys, treats, pencils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often loses temper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rather solitary, prefers to play alone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generally well behaved, usually does what adults request	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Many worries or often seems worried	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helpful if someone is hurt, upset or feeling ill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Constantly fidgeting or squirming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has at least one good friend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often fights with other children or bullies them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often unhappy, depressed or tearful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generally liked by other children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easily distracted, concentration wanders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nervous or clingy in new situations, easily loses confidence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kind to younger children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often lies or cheats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Picked on or bullied by other children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often offers to help others (parents, teachers, other children)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thinks things out before acting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steals from home, school or elsewhere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gets along better with adults than with other children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Many fears, easily scared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Good attention span, sees work through to the end	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix I

INFORMED CONSENT AND PARENT PERMISSION FORM

Study Title: Physiological Responses During Parent and Child Interaction
Investigators: Deanna Swain, B.A. swaindm@vt.edu
Reina Factor, B.A. rfactor@vt.edu
Angela Scarpa, Ph.D. ascarpa@vt.edu

I. Purpose of this Research

The purpose of this study is to understand the relationship between maternal stress and mother child interactions. The purpose for conducting this research is for a thesis project and results may be submitted for publication. The number of subjects involved includes 75 mother and child dyads. Children range in age from 7 to 12 years.

II. Procedures

Should you agree to participate, we will email you a secure link of measures for you to complete. You may complete these measures before or during the 45-minute session at the Virginia Tech Autism Clinic or Higher Education Center. Mothers will be asked to abstain from consumption of caffeine or use of nicotine 1 hour before the visit. Mothers will complete additional questionnaires regarding their child's behavior, parenting stress, and demographic information while their child will be administered an abbreviated IQ test (Wechsler Abbreviated Scale of Intelligence, Second Edition). If you do not complete the questionnaires during the visit, you will be able to complete them at home following the secure link. The questionnaires should take about 1.5 hours to complete in total. Mothers will then engage in an activity with their child, during which they will wear a heart rate monitor attached around the torso. Mothers will wear the heart rate monitor for approximately 10-15 minutes, during which they will engage in a 5-minute task with their child, which will be recorded via video for behavioral coding by trained research assistants. We will collect physiological data (i.e. heart rate) from mothers only.

III. Risks

There are no more than minimal risks to you and your child by participating in this study. However, while participating in the activity with your son or daughter, you may experience some stress as the task may be difficult for him or her. In addition, there could be some discomfort from wearing the chest heart rate monitor. Note, however, that these procedures have been used by these investigators in several other studies, with no complaints.

IV. Benefits

There is a societal benefit of increasing the understanding of the relationship between maternal stress and mother interactions with her child, which can help inform future intervention studies.

V. Extent of Anonymity

Confidentiality will be assured by assigning code numbers to all participants (i.e. you and your child), and only these identifiers will appear on data collection instruments and documents used in statistical analyses. No information concerning a participant will be released without the

participant's written consent. No presentations or publications resulting from this project will identify individual parties. Confidentiality will not be maintained, however, if you express intent to harm or kill yourself or someone else, as we are legally required to divulge that information to the appropriate public authorities. Further, in accordance with applicable laws, confidentiality will be breached and proper authorities contacted if either parent or child reports an incident of child abuse or neglect.

VI. Compensation

You will be compensated \$10.00 for your participation and your child will receive a small toy.

VII. Freedom to Withdraw

You should also understand that you or your child are free to withdraw from the study at any time. You do not have to answer any questions that you do not choose to.

VIII. Participant's Responsibility

Signing of this form and agreement to participate is voluntary. You are responsible for answering questionnaires about your past and recent experiences as well as wear a heart rate monitor while completing several different tasks. Your child is responsible for completing a task with you.

IX. Questions or Concerns

Should you have any questions about this study, you or your child may contact one of the research investigators whose contact information is included at the beginning of this document.

Should you have any questions or concerns about the study's conduct or your rights as a research subject, or need to report a research-related injury or event, you may contact the VT IRB Chair, Dr. David M. Moore at moored@vt.edu or (540) 231-4991.

X. Participant's Permission

You and your child have read and understood the Informed Consent Form and conditions of this project. You and your child have had all your questions answered. You and your child hereby acknowledge the above and give your voluntary consent for participation in this project. If you participate, you or your child may withdraw at any time. You and your son or daughter agree to abide by the rules of this project.

XI. Subject's Consent

If my child or I participate in other studies affiliated with the VT Autism Clinic (VTAC) or the VT Center for Autism Research (VTCAR), our data will be given a code and potentially combined with our other coded data. A master list will be maintained in order to match our current data with previously collected data. Our names from this master list will only be available to VTAC or VTCAR staff and will not be shared with others. I may be contacted for future studies if I give separate permission below.

____ Yes, I would like to be contacted for possible participation in future studies through VTAC or VTCAR. I understand I would be under no obligation to participate in these studies if contacted. I can decide at that time if I would like to participate.

My child and I have read the Consent Form and conditions of this project. My child and I have had all my questions answered. My child and I hereby acknowledge the above and give my voluntary consent:

_____ Date _____
Subject signature

Subject printed name

Appendix J

VERBAL CHILD ASSENT FORM (AGES 7-12 YEARS) Virginia Tech Physiological Responses During Parent and Child Interaction

Investigators: Deanna Swain, B.A.
Reina Factor, B.A.
Angela Scarpa, Ph.D.

Hi _____,

We are asking you to be in a study at Virginia Tech so that we can understand how you and your mom interact while you play a task. We would like to know if you are okay with being in the study. You do not have to be in this study if you do not want to. You can stop being in the study at any time. Nobody will be mad or upset and we will still treat you the same no matter what.

As part of this study, you will be asked to come to Virginia Tech one time play some games with a research assistant and with your mom. Your mom will be filling out forms while you play the games with a research assistant.

Nothing that you do during your visit here is dangerous, and all of the information we get from you or your mom is private. This means nobody can see the information unless your parent says it is okay for them see it. If you tell us about harming or hurting yourself or others or the court asks us, we cannot keep that information private. At the end of the visit, you will receive a small toy as a thank you for your participation.

If you are worried about something and want to ask questions let the person you are with know that so that they can help you. Do you have any questions right now about anything I just said?

Obtain verbal assent via reading this script and get confirmation from the child that they understand what is going to happen during their visit. Also make sure that the parent consent form, along with this verbal assent for children is completed.

Child's name: _____

Date: _____