MATERNAL NEGATIVE AFFECTIVITY AND CHILD INTERNALIZING PROBLEMS: CHILD BEHAVIORAL INHIBITION AS A MEDIATOR

by

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Presented to the Faculty of the Graduate School of

The University of Texas at Arlington in Partial Fulfillment

of the Requirements

for the Degree of

MASTER OF SCIENCE IN PSYCHOLOGY

THE UNIVERSITY OF TEXAS AT ARLINGTON

August 2015

Acknowledgements

I would like to thank my mentor and thesis committee chair, Dr. Jeffrey Gagne, for his unconditional support and advice on this project. This research would not be possible without him. Also I would like to thank my committee members, Dr. Angela Dougall and Dr. Jared Kenworthy, for their guidance and support on this project and my study at UT Arlington. Thanks to my lab mate Catherine Spann who kindly and patiently answered all my questions along the way, and to our former lab staff Jerry Prater who made data collection an easy and productive process. I would also like to acknowledge all the help from undergraduate students in our lab, Luis Macias, Sauntymia Keys, Afsoon Gazor, Rita Nolet, Joshua Cummings, Chelsi Najera and many other “strangers” for their great work on data collection and coding.

Thanks to my parents, who always listen to my complaints and provide me with tremendous support. Also special thanks to Lusha Xu for being a generous supporter along the way, and I hope you forgive me for giving more attention to my thesis than you in the past few months.

July 20, 2015

Abstract

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Early emerging internalizing problems such as depression, anxiety, and social withdrawal put children at great risk for developing mood disorders and substance abuse problems. The current study investigated both child behavioral inhibition (BI) and maternal negative affectivity (NA) as predictors of internalizing problems in a preschool sample, and a mediational process between maternal NA and internalizing problem was hypothesized and tested. One hundred families with two children aged between 2.5 and 5.5 participated the study. The study included an online survey section and a laboratory visit. A multi-method approach with both questionnaire and behavioral assessments was used to measure child BI. The results suggested that it is more likely to find significant results with parent-rated measures; however, these findings could be biased. High levels of child BI and greater maternal NA significantly predicted internalizing problems. BI and age also had an interaction effect on internalizing problems. Additionally, parent-rated BI was found to mediate the association between maternal NA and internalizing problems, and the mediational process was particularly significant for younger children. The developmental trajectory of internalizing problems was discussed, and future studies should focus on gathering longitudinal data and modeling additional family/individual factors as potential moderaters/mediators.

Table of Contents

List of Illustrations

List of Tables

Chapter 1

Introduction

1.1 Overview

Child internalizing problems are described as emotional disturbances that are directed toward the self, and these problems often include anxiety, fear, depression, shyness, and low self-esteem (Ollendick & King, 1994). Symptoms of internalizing problems can develop into seirous clinical disorders such as generalized anxiety disorder, social anxiety disorder, and major depressive disorder, which put children at great risks for substance abuse, poor peer relationships, social isolation, and potentially suicide (Krueger, 1999; Roza, Hofstra, van der Ende, & Verhulst, 2003). A considerable amount of research attention has been given to associations between child temperament and internalizing problems. Family and parental factors have also been widely investigated, but the studies were usually limited to certain domains (e.g., parenting styles, family conflict, parental mental health status, and socioeconomic status). These factors are often treated either in isolation or in parallel with child temperament and other related constructs.

Generally, paternal or maternal disposition to negative emotions is an under-explored factor. Related constructs such as maternal depression, parental stress, and anxiety symptoms have been widely used as predictors of child social and cognitive functioning outcomes, but a limited number of studies investigated trait-oriented constructs (Crawford, Schrock, & Woodruff-Borden, 2011). Some recent pioneering works suggested that there could be both a direct and indirect relationship between negative maternal traits and child outcomes (Crawford et al., 2011; Kiel & Macck, 2012; Prinzie et al., 2005), but the process is still unclear. The questions remain as to what are the specific moderating/mediating factors and how do they outline the direct/indirect

associations between mother and child? It is not uncommon for developmental researchers to investigate both familial and child level variables as moderator/mediators. For example, Crawford et al. (2011) used path analysis and found that family functioning moderated the relationship between maternal personality and child internalizing problems. They also suggested that a child temperament trait (effortful control) played a mediating role in this relationship, but their sample size was relatively small (*N* = 65) and only used questionnaire measures. Using a family study design, the current research further explored the association between maternal traits and child internalizing problems by modeling the behavioral inhibition dimension of child temperament as a mediator within a larger preschool-aged sample. In addition, a multi-method approach to assessment utilizing both questionnaire and observer ratings of temperament were employed to address the measurement problems in the field.

1.2 Behavioral Inhibition and Internalizing Problems

Child temperament is defined as early-appearing, relatively stable, and genetically influenced predispositions in domains of emotionality, activity, and reactivity (Goldsmith et al, 1987; Shiner et al, 2012). Children are not born with fully developed dimensions of temperament, that is, temperament dimensions emerge in early childhood and its expressions can be strongly influenced by experience and environment (Rothbart & Mauro, 1990; Rothbart, Ahadi & Evans, 2000). Temperamental traits such as emotions and components of emotions tend to appear at different ages (Izard, 1977; 1987), and reactivity systems including self-regulatory efforts seem to be late-appearing as well (Rothbart et al., 2000). Therefore, it is important to study temperament across different age ranges or longitudinally as a developmental process.

Behavioral inhibition (BI) or fearfulness is a specific temperamental dimension that reflects individual differences in reactions to unfamiliar stimuli (Kagan, Reznick,

Clarke, Snidman, & Garcia-Coll 1984; Kagan, 1997; Rothbart & Mauro, 1990; Rothbart, Ahadi, Hershey, & Fisher, 2001). In a novel environment (e.g. exposure to unfamiliar people), individuals either tend to display inhibited behaviors including shyness in contact, delay in speech, withdrawal from social interactions, and reduction in motor activities or uninhibited behaviors such as active approaching and initiation of conversations (Coll, Kagan, & Reznick., 1984; Kagan et al., 1988). Kagan, Reznick, & Snidman (1987) categorized children into inhibited and uninhibited types based on their behavioral responses to unfamiliarity. Longitudinal studies showed that BI status is relatively stable across age. Early appearing (within 1 year) and extreme inhibited or uninhibited children are less likely to change than moderately inhibited or uninhibited children (Hirshfeld et al., 1992; Pfeifer, Goldsmith, Davidson, & Rickman, 2002). BI is believed to be an involuntary process, Eisenberg et al. (2004) used the term reactive control to describe the automatic responses (as opposed to effortful control) in controlling certain impulses or behaviors, and reactive overcontrol is believed to be reflected in inhibited behavioral responses. Although the original definition of BI might be purely behavioral, inhibited behaviors were also found to be biologically based and physiologically evident. Individual differences in inhibited behaviors can be partially attributed to an overactive amygdala, and these behaviors are often accompanied by physiological responses including increased heartbeat rates and arousal in the sympathetic nervous system (Kagan et al., 1987, Fox, Henderson, Marshall, Nichols, & Ghera, 2005). Since these behavioral and physiological characteristics overlap with manifestations of many related constructs in early childhood including shyness, fearfulness, and social anxiety, Rothbart and Mauro (1990) suggested that assessments of these constructs can also constitute measures of the early temperament trait of BI.

The social and behavioral consequences of inhibited temperament have been widely studied in the child development literature. Associations between early childhood BI/fearfulness and internalizing problems (including dimensional subcategories of internalizing) are well-established in the field of child temperament and psychopathology. Eisenberg et al. (2001, 2009) found that pure internalizing problems (not comorbid with externalizing problems) were associated with low impulsivity in children, whereby low impulsivity implied an inhibited behavior overcontrol (BI). This association could be universally true as such findings were also replicated in cross-cultural studies in a Chinese sample (Eisenberg et al., 2007). In addition, child age typically positively predicts internalizing problems (Bongers, Koot, van der Ende, & Verhulst, 2003); however, it could be more complicated when BI is also taken into account. Williams et al. (2009) found an interaction whereby high BI children showed greater internalizing problems at age 4 but less internalizing problems in later childhood and adolescence than low BI children, but they did not provide a plausible explanation. Surprisingly, the interaction pattern between BI and age is largely unknown for preschool age children due to a lack of research. From a clinical perspective, a recent meta-analysis concerning BI and risks for developing social anxiety disorder (SAD) found that BI was associated with a greater than sevenfold increase in likelihood for developing SAD (Clauss and Blackford, 2012). In another investigation, Biederman et al. (2001) found that SAD was more prevalent among inhibited children than uninhibited children, and they argued for BI to be a specific index of proneness to development of SAD.

1.2 Assessments of Behavioral Inhibition – A Multi-Method Approach

Investigations involving child temperament traits as risk factors have often been restricted by limited measurement strategies. Parent-report questionnaire measures are the most commonly used assessment tools in temperament investigations. These ratings

are relatively easy to collect, provide rich information about child behaviors based on daily observations, and usually have high internal reliability (Rothbart & Goldsmith, 1985). However, parent reports are often biased due to the possible projections of parent personality on item responses (Allen & Prior, 1995; Bate & Bayles, 1984, Rothbart & Hwang, 2002) and exaggerated perceptions of differences between twins or siblings, namely *contrast effects* (Saudino, 2003; Saudino, Wertz, Gagne, & Chawla, 2004). Several studies also suggested that parental reports of child temperament are usually heavily influenced by parental mental health statuses, such as aggressive, depressive or anxiety symptoms (Vaughn, Taraldson, Crichton, & Egeland, 1981; Mebert, 1991). The criticism of using parent-report measures alone has led temperament researchers to seek out more objective ratings or assessments.

As a complement to parent ratings, researchers have been successfully incorporating structured laboratory assessments into temperament studies. In Kagan's classic studies of BI (Kagan, et al., 1987), infants at various ages were brought into the laboratory to participate in behavioral assessments. They used a paradigm in which the child would be exposed to novel stimuli (object or person), and their reactions would be recorded and later analyzed. Following a similar idea but on a broader scope, the Laboratory Temperament Assessment Battery (*Lab-TAB*; Goldsmith & Rothbart, 1996) was developed to provide assessments for multiple temperamental dimensions (e.g. activity level, fearfulness, inhibitory control, etc.) at various age ranges with pre-locomotor, locomotor, and preschool versions. The Lab-TAB uses a series of behavioral episodes to elicit child emotional/behavioral responses that are believed to reflect certain dimensions of temperament. The BI/fearfulness assessment in Lab-TAB features a scripted stranger-child interaction episode, which has been widely used in both cross-sectional and longitudinal studies with demonstrated good reliability and validity (see:

Pfeifer et al., 2002; Hane, Fox, Henderson, & Marshall, 2008; Durbin, Hayden, Klein, & Olino, 2007; Majdandžić & Van Den Boom, 2007). These behavioral approaches allow researchers to capture detailed parameters and micro-dynamics of temperament as compared to the global perspective in questionnaire measures; however, Goldsmith & Gagne (2012) also pointed out that the problem with laboratory assessments lies within the differentiation of state- and trait-like behaviors and difficulty to rule out environmental influences in the laboratory setting. Therefore, there is a growing trend among temperament researchers of using a multi-method approach. A combination of both parent-report and laboratory assessment is thought to be more comprehensive and accurate in temperament investigations (Hwang & Rothbart, 2003; Majdandžić & Van Den Boom, 2007; Gagne, Van Hulle, Aksan, Essex, and Goldsmith, 2011). The current study utilized this multi-method approach to assess child BI. Differences in findings obtained from laboratory and parent-report measures were also highlighted and discussed.

1.3 Maternal Negative Affectivity and Child Outcomes

As described by Watson and Clark (1984), negative affectivity (NA) is a high-order mood dispositional dimension that reflects pervasive individual differences in negative emotionality and self-concept. Individuals high in NA tend to experience a more intense level of negative mood states, such as nervousness, tension, and worry. They also tend to react more strongly to stressful situations and are more inclined to hold negative views against themselves and others (Watson & Clark, 1984, Watson & Pennebaker, 1989). Narrower labeling of NA includes trait anxiety (Spielberger, Gorsuch, & Lushene, 1970), low self-esteem, and neuroticism as a personality dimension (Watson & Clark, 1984). According to Watson, Clark, & Carey (1988), NA was broadly correlated with both symptoms of anxiety and depression. Even though NA might not be optimal in

differentiating certain diagnoses such as anxiety versus depression, it was nonetheless a very useful index of vulnerability to general psychological distress (Watson et al, 1988; Mathews & MacLeod, 2005). In a psychometric review of relations between anxiety and depression, Clark & Watson (1991) proposed a tripartite model to structure these two different mental disorders. This model suggested that both anxiety and depression share a significant nonspecific factor (later referred to as *Negative Affectivity*) that encompasses general affective distress, whereas syndrome-specific factors contribute to the specificity of anxiety (physiological hyper-arousal) and depression (absence of positive affect/anhedonia) (Clark & Watson, 1991; Oehlberg, Revelle, Mineka, 2012). More recent research also highlighted trait neuroticism as the latent structure that is responsible for emotional disorders such as anxiety and depression (Barlow, Sauer-Zavala, Carl, Bullis, & Ellard, 2014).

Mothers with negative affectivity (NA) may influence their children in various ways. From a temperamental perspective, as suggested by Vaughn, Bradley, Joffe, Seifer, and Barglow (1987), maternal characteristics could be viewed as a primary source of individual differences in child temperament. They found that maternal factors such as anxiety level and personality assessed in the prenatal stage predicted infant temperament using both parent-report and physiological measures (Vaughn et al., 1987). Multiple investigations also revealed a potential genetic link between parent characteristics and child temperament (DiLalla, Kagan, Reznick, 1994; Sheese, Voelker, Rothbart, & Posner, 2007). In a molecular genetics study, Sheese et al (2007) found that the DRD4 7-repeat allele increased children's sensitivity to environmental factors such as parenting. In addition, results from behavioral genetics studies using twin samples also exhibited strong evidence of genetic influences on various focal temperament dimensions including BI, whereas monozygotic twins are generally more similar than dizygotic twins

in terms of being fearful and extremely behaviorally inhibited (DiLalla et al., 1994; Goldsmith, Lemery, Buss, & Campos, 1999). In a review of the behavioral genetics approach in temperament research, Saudino (2005) concluded that the estimated heritability of temperament traits generally fall into a range of .20 to .60 across different samples, indicating that genetic differences could explain up to 20% to 60% variability of temperament within a population. On the other hand, maternal NA could influence child BI through environmental influences; for example, parenting. Previous studies found links between maternal personality and BI where parenting behaviors acted as a moderator (Coplan, Reichel, & Rowan, 2009; Fox et al., 2005; Prinzie, Stams, Dekovic, Reijntjes, & Belsky, 2009). Bornstein, Hahn, and Haynes (2011) also suggested that maternal personality has a small to medium effect size on parenting cognitions and practices, and maternal NA (or simply neuroticism) may amplify life stresses that undermine parenting.

From a psychopathological perspective, certain traits in mothers could lead to the development of behavioral problems in their children as well, either directly or indirectly. Although there is a lack of research that directly investigated maternal NA and child problems, some studies shed some light on this relationship with similar constructs. For example, Kiel and Maack (2012) revealed an indirect link between maternal behavioral inhibition sensitivity (BIS) and internalizing problems in toddlers, whereby parenting partially mediated this relationship. Most other related research tend to focus on narrower constructs such as maternal depression or anxiety. In a meta-analytic review, Lovejoy, Graczyk, O'Hare, and Neuman (2000) examined studies investigating maternal depression and parenting behaviors, and they suggested that parenting problems observed among depressed mothers may be associated with broadband NA rather than depressive symptoms alone. Thus, exploring broadband NA would be particularly interesting to investigators who conduct developmental research considering parental

factors. More recently, Goodman et al. (2011) pointed out that even though the literature on associations between maternal depression (as a narrow construct of NA) and child psychopathology is well-established, the moderators/mediators underlying this link are still underexplored, especially within specific domains of child behavioral problems (e.g., internalizing vs. externalizing). In addition, most studies chose to emphasize family environmental risk factors as moderator/mediators. For example, the aforementioned studies all examined parenting/parenting practices (Prinzie et al., 2005, Lovejoy et al., 2000, and Kiel & Macck, 2012). Similarly, in an investigation of maternal depressive symptoms and child internalizing problems, McCarly and McMahon (2003) focused on family and social factors and did not examine any child temperament traits as possible mediators. Therefore, the lack of research in exploring child temperament as an intermediate factor in mother-child associations inspired the current study.

1.4 The Current Study and Hypotheses

The current study focused on maternal NA as a broadband predictor by assessing both trait and affect-related constructs such as maternal depression, neuroticism, trait anxiety, and current negative affect state. Child BI was assessed with both laboratory ratings and parent reports. The study examined direct relationships between maternal NA and child BI as well as the association between child BI and internalizing problems. Moreover, a mediational model was hypothesized, in which the association between maternal NA (family level factor) and child internalizing problems (individual level factor) was mediated by child BI (individual level factor). These proposed models were tested using multilevel modeling to compensate for the non-independent nature of observations in family data by controlling random familial effects. The present study had four specific hypotheses.

1.4.1 Hypothesis 1

The first aim was to compare parent-report with observer ratings of behavioral inhibition. I hypothesized that these ratings would be moderately correlated with each other. Both measures of BI would be correlated with maternal NA, internalizing problem and its subcategories. Differences in predictive power would also be addressed along with Hypothesis 2 and 3.

1.4.2 Hypothesis 2

The second hypothesis proposed that child behavioral inhibition, age, and maternal negative affectivity would positively predict internalizing problems and its subcategories including anxious-depressed and withdrawn problems. Given the findings from Williams et al. (2009) and the age range in our sample (2.5 to 5.5 years), I also expected a similar interaction pattern in our sample. BI would be treated as a moderator to the developmental trajectory of internalizing problem. Specifically, children with higher BI score would have less increase in internalizing problems than children with lower BI. Child gender and an interaction term between BI and maternal NA were also included in the model; however, I did not expect any significant effects.

1.4.3 Hypothesis 3

The third hypothesis proposed a multilevel moderated mediation model. Child BI would partially mediate the link between maternal NA and child internalizing problems, providing evidence of an indirect relationship. Specifically, I predicted that greater maternal negative affect would contribute to high BI in their children, and the heightened fearfulness would lead to increased internalizing problems. Additionally, I expected child age to moderate the link between BI and internalizing problems (path *b*), that is, the mediation effect could be conditional depending on the child age. Based on the proposed

moderation effect in hypothesis 2, I predicted that this mediational effect was more significant for younger than older children.

Chapter 2

Methods

Participants in this study included 100 families with two or three siblings (*N* = 201) between 2.5 and 5.5 years of age *(M* = 3.86, *SD* = 1.04), in which 104 were boys and 97 were girls. The mean age was 3.77 years (*SD* = .99) for boys and 3.96 (*SD* = 1.08) for girls. The sample included 57 full sibling pairs, 10 monozygotic twin pairs, 32 dizygotic twin pairs, and 1 set of triplets. Regarding racial distribution, 13% of children, 7% of mothers, and 8% of fathers were reported as Hispanic or Latino. Participants in the sample were predominately white (84% children; 88% mothers; 87% fathers), followed by individuals identified with more than one race (11% children; 5% mothers; 4% fathers) and African American individuals (4% children; 4% mothers; 7% fathers). Less than 3% of the families reported themselves as Asian American, Pacific Islander, and other races. Most families in this sample were middle to middle-upper class. The average annual household income was approximately $70,000, ranging from $20,000 to over $200,000, and mean parental education was 15.82 for mothers and 15.12 for fathers, ranging from 8 to 22.

2.2 Study Procedures

Families were recruited from the Dallas-Fort Worth Metroplex beginning in 2012. Recruitment methods included flyers on campus, pediatricians' offices, day care centers, Internet postings, and the study website. Participants were screened for eligibility before the data collection started. After the initial screening, qualified participants completed a series of online surveys using SurveyMonkey.

Parents were asked to complete two child temperament surveys, one depressive symptom questionnaire, one affect measure, and one personality inventory online. Of the 126 families who completed the online surveys, 100 families also participated in a

subsequent 1-2 hour laboratory visit. The laboratory visit included a series of behavioral and cognitive assessments which were described to the children as “fun games”, and one of these behavioral assessment episodes was used in the present study. Parents were also asked to fill out additional questionnaires regarding child behavioral problems and parent anxiety during the visit. Participants received a $25 gift card for completing all online surveys, and they were compensated with another $50 gift card upon completion of their laboratory visit. No significant differences were found between the laboratory visiting sample and the online questionnaire only sample in terms of parental age, years of education, family income, and child age at completion of questionnaires. All procedures were reviewed and approved by the University of Texas at Arlington Institutional Review Board.

2.3 Measures

2.3.1 Child Behavioral Inhibition/Fearfulness

2.3.1.1 Laboratory Assessment of Behavioral Inhibition.

Child BI was measured observationally with the Laboratory Temperament Assessment Battery (Lab-TAB) Preschool Version (Goldsmith, Reilly, Lemery, Longley, & Prescott, 1995). The Lab-TAB is a comprehensive standardized laboratory assessment tool which is designed to elicit expressions of specific temperament dimensions. One Lab-TAB episode, *Stranger Approach* was used to assess child BI/fearfulness to an unfamiliar person. In this episode, the experimenter instructed the child to stand by the wall waiting for him/her to return and then left the test room. Then a stranger wearing a dark blue sweatshirt and a pair of sunglasses entered and greeted the child. The stranger gradually approached the child by reducing the physical distance while trying to engage in conversations with the child. The script required the stranger to ask questions such as “are you having fun today? ”, and “what’s your favorite game?” with a neutral face. Then

the stranger claimed that he/she came in to look for some papers and subsequently left the experimental room. Child responses were recorded during this procedure for behavioral coding. The episode was divided into 7 to 8 discrete trial epochs along the timeline, allowing coders to capture behavioral details in terms of facial, bodily, and vocal fearfulness. Coded variables included facial fear expressions, intensity of distressed vocalizations, levels of activity decrease, approaching/escaping behaviors, verbal hesitancy, frequencies of nervous fidgeting movements, and latencies to first fear response and vocalizations. All aforementioned Lab-TAB procedures followed the preschool manual, and the behavioral coding was carried out based on a modified version of the standard preschool Lab-TAB coding protocol (Goldsmith et al., 1995, see Appendix A). Coders were trained to reach at least 80% agreement with the master coders before proceeding to code the episodes independently. Twenty percent of the sample was rated by a separate coder, and the percent agreement exceeded a standard of 85%.

2.3.1.2 Parent Report of Behavioral Inhibition

Toddler Behavior Assessment Questionnaire – Revised (TBAQ-R). The TBAQ-R (Goldsmith, 1996) was used as one of the parent report measures of BI. The TBAQ-R is a 120-item questionnaire that assesses multiple dimensional traits of child temperament, including fearfulness (social fear & object fear). Only the social fear subscale was used to measure BI as it represents a parallel to the Lab-TAB *Stranger Approach* episode. The TBAQ-R contains items describing child behaviors in specific situations, and parents rate these behaviors based on the frequency of occurrence over the previous month, for example: “ When one of the parents' friends who did not have daily contact with your child visited the home, how often did your child talk much less than usual? ” All items are formatted in a 7-point Likert scale that ranges from 1 (“never”) to 7 (“always”) and

includes an “N/A” option to indicate that the child was not in the described situation recently. The internal consistency for the 10-item social fear subscale was .86, and it typically ranges from .83 to .87 (Goldsmith, 1996).

Emotionality Activity Sociability Temperament Scale (EAS). Another parent report measure of BI employed in this study was the EAS temperament scale (Buss & Plomin, 1984). This 20-item scale captures four major dimensions of temperament: emotionality, activity, shyness, and sociability. The items are general statements about the child, and parents respond on a scale of 1 (“strongly disagree) to 5 (“strongly agree”). For example: “Child likes to be with people” (sociability), “Child takes a long time to warm up with strangers” (shyness). Subscales on shyness and sociability were used in the current study to assess BI. Cronbach’s alpha was .75 for the 5-item shyness subscale, and .89 for the 5-item sociability measure. Published internal consistencies for theses sub-constructs range from .80 (emotionality) to .88 (shyness) (Rowe & Plomin, 1977).

2.3.2 Maternal Negative Affectivity

Depressive Symptoms. The Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977) was used to measure maternal depressive symptoms. The CES-D is a 20-item self-report questionnaire that assesses individual’s depressive symptoms experienced over the previous week. CES-D items include cognitive, emotional, behavioral and positive affect attributes rated on a 4-point Likert scale from 0 (“rarely or none of the time/less than 1 day”) to 3 (“most or all of the time/5-7 days”). Sample items include: “I thought my life had been a failure”, “I felt that people disliked me”. Sum scores of the these items were taken as indicators for levels of depressive symptoms. Higher scores indicate more depressive symptoms within a total range from 0 to 60. Cronbach’s alpha for CES-D in our sample was .84, and published internal consistencies ranging from .84-.90 (Radloff, 1977).

Trait Anxiety. Parent trait anxiety was measured using the State-Trait Anxiety Inventory (STAI; Spielberger et al, 1970). The STAI contains two separate self-report scales that measure state anxiety (A-State) and trait anxiety (A-Trait). The current study only used the A-Trait scale, which includes 20 statements describing general feelings with a 4-point Likert scale from 1 (“almost never”) to 4 (“almost always”). Sample items include: “I wish I could be happy as others seem to be”, “I have disturbing thoughts”. Higher scores indicate greater level of disposition in experiencing anxiety. The internal consistency reliability for the A-Trait scale on the STAI in our sample was .90, and published internal consistency typically ranges from .86 to .95 (Spielberger, 1989).

Neuroticism. The Big Five Inventory (BFI; John & Srivastava, 1999) was used to assess parent personality dimensions. The BFI includes 44 items that measure personality on 5 factors: extraversion, openness, conscientiousness, agreeableness, and neuroticism, and the current study used the 8-item neuroticism subscale as an NA measure. Participants were asked to rate statements describing the self on a scale from 1 (“disagree strongly”) to 5 (“agree strongly”). Sample questions on the neuroticism subscale includes: “Is depressed, blue”, “Worries a lot”. The Cronbach’s alpha was .81 for the neuroticism subscale. Published alpha reliabilities of the BFI scales typically range from .75 to .90 and average above .80 in US and Canadian samples (John & Srivastava, 1999).

Negative Affect. The negative affect subscale in the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was used as the state measure of maternal NA. The entire scale includes 20 items that measure both positive and negative affect states (10 on each subscale). Participants respond to a series of words describing their current feelings and emotions on a 1 (“very slightly or not at all”) to 5 (“extremely”) Likert scale. Examples of these words include “upset”, “ashamed”, and “nervous”. The

reliability of the 10-item NA scale was .86, and it was consistent with the typical range of .84 to .87 (Crawford & Henry, 2004).

2.3.3 Internalizing Problems

The Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000) was used to assess internalizing problems. The CBCL is a well-known 100-item questionnaire that measures children's socio-emotional functioning and behavioral problems. Parents were asked to rate their child's behaviors in the past two months on a scale from 0 ("not true") to 2 ("very true or often true").The anxious-depressed problem and withdrawn problem subscales as well as the broadband internalizing problem scale were used in the current study. The anxious-depressed scale assesses anxiety and mood problems, and the withdrawn scale measured the tendency to withdraw from social settings respectively. Sample items include "Gets too upset when separated from parents", "Avoids looking others in the eye". Subscale total scores were calculated using summations of raw parental responses to items on each subscale, and these total scores were *z*-transformed prior to analyses. Standardized raw scores were used instead of *T* scores per the CBCL scoring manual because *T* scores calculated by CBCL scoring software are truncated and do not account for the full range of variation (Thurber & Sheehan, 2012). Higher scores represented more behavior problems. Cronbach's alpha was .87 for the 36-item broadband internalizing problems, .70 for the 8-item anxious-depressed problems, and .70 for the 8-item withdrawn problems scales. This was fairly consistent with the published internal consistencies for the CBCL, which average .76 for narrow constructs and .92 for broad constructs (Achenbach & Edelbrock, 1983).

2.4 Data Analysis

Bivariate Pearson correlations were used to test hypothesis one. Additionally, partial correlations between parent ratings of child BI and internalizing problems while

controlling for maternal NA were also examined to rule out the potential effect of mental health status. It was hypothesized that both observed and parent ratings of BI would be significantly correlated with internalizing, anxious-depressed, and withdrawn problems. Such associations between parent-rated BI and internalizing problems would remain significant even after controlling for maternal NA.

Since the study used a nested structural design (siblings nested within families) that violated the assumption of independent observation, using the traditional ordinary least squares (OLS) regression models would increase the likelihood of making a Type I error (Cohen, Cohen, West, & Aiken, 2003). The regression models for Hypotheses 2 and 3 were tested using multilevel models (hierarchical linear models). Multilevel modeling addresses non-independence by using an unbiased restricted maximum likelihood estimate (REML) of variance components. This modeling technique also allows the prediction models to include both fixed and random effects at the same time (Kenny, Kashy, & Cook, 2006). The fixed effects are similar to the prediction effects in OLS regressions, and the random effects assume that an effect follows a normal distribution instead of a fixed value. Thus, the total variance in a mixed effect model would be a summation of both individual level (level 1) fixed effects, family level fixed effects (level 2), random effect variance, and random error variance. Typically in a multilevel model, both slopes and intercepts are allowed to vary; however, dyads (cluster of two) do not necessarily have enough level 1 units (in our case siblings) to allow the slopes to vary from group to group (Kenny et al., 2006). Therefore, the non-independence was modeled as variations in intercepts, which include random familial effects and random error variance. A complete function of a model in hypothesis 2 would be as follows:

$$Y_{ij} = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2j} + \beta_3 (X_1 X_1)_i + \beta_4 (X_1 X_2)_{ij} + \beta_5 (family)_j + \varepsilon_{ij},$$

where Y_{ij} is the observed internalizing problems for the *i*th individual in *j*th family; X_1 and X_2 are the level 1 variable and the level 2 variable respectively; β_0 is the grand mean of *Y* for individuals score 0 on both level 1 and 2 predictors; β_1 and β_2 are the fixed effects of level 1 and level 2 predictors, respectively; β_3 is the fixed effect of level 1 interaction; β_4 is the fixed effect of the cross level interaction; β_5 is the random familial effects, and ε_{ij} is the random error variance. The random slope would be a summation of β_0 , β_5 , and ε_{ij} . A visual illustration of the random intercept model is presented in Figure 2-1, the solid line represents the grand mean of the *X* effect on *Y* while the broken lines represent the random variations of intercepts from family to family. Six models were run to analyze 3 different outcome variables and 2 different BI measures, and these analyses were performed using the *lme4* package in *R* (Bates, Mächler, Bolker, & Walker, 2014).

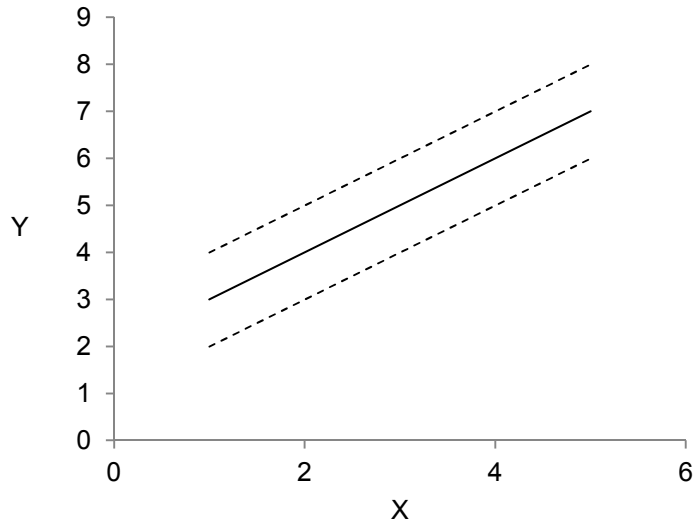

Figure 2-1 A Graphic Illustration of Random Intercept Model

Hypothesis 3 was examined by a series of 2-1-1 multilevel mediation models (Figure 2-2) with age as a moderator to path *b*. The level 2 variable, maternal NA was the initial predictor of internalizing problems, and this process was mediated by the level 1

variable, child BI. A total of six models were run to accommodate two different measures of BI and three different outcomes. All multilevel mediation procedures followed Krull and MacKinnon (2001) and Zhang, Zyphur, and Preacher (2009), and the moderated mediation testing followed recommendations of Bauer, Preacher, and Gil (2006) and Preacher, Rucker, and Hayes (2007). The mediational analyses were carried out using the Mplus 7 software (Muthén & Muthén, 1998-2012).

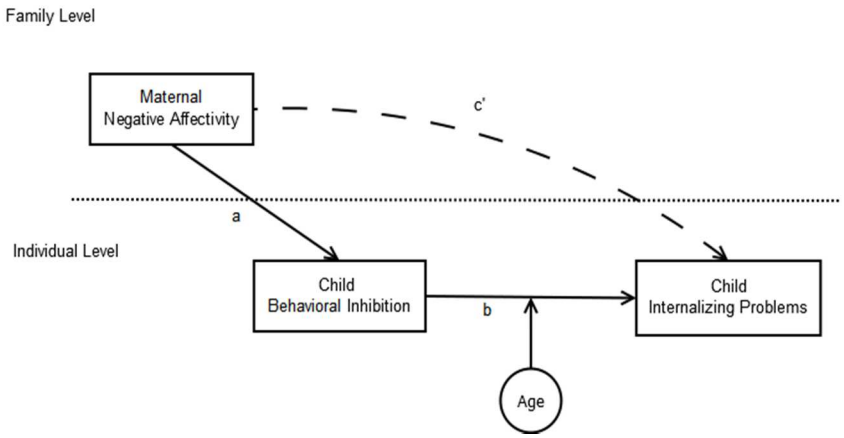

Figure 2-2 Conceptual Model of the Hypothesized 2-1-1 Moderated Multilevel Mediation

Chapter 3

Results

3.1 Data Screening and Reduction

3.1.1 Missing Value Analysis

Data were screened for missing values before hypothesis testing. Three variables had missing values: Internalizing problems (4.0%), Anxious-depressed problems (.5%), and Withdrawn problems (.5%). The Little's Missing Completely at Random (MCAR) test suggested that the data were missing completely at random, χ^2 (41) = 40.03, p = .51. The missing values were then imputed using the expectation-maximization (EM) algorithm in SPSS. Imputed data were used in later analyses.

3.1.2 Factor Analysis and Scoring

A factor analysis was conducted to reduce dimensions and generate composite scores for the Lab-TAB rating of BI. To obtain a composite score, raw coded responses were averaged across all trial epochs so that the mean scores represented the levels of the corresponding parameters. A factor analysis using principle axis factoring with oblique rotation was used to detect the latent structure of Lab-TAB BI. Oblique rotation was chosen because the underlying structures were considered to be correlated with each other. Three factors were extracted and explained 60.01% of the variance, and the results are presented in Table 3-1.

Table 3-1 Factor Analyses for Data Reduction

Assessment	Coded Parameters	Factors			
		1	2	3	
Stranger Approach	1. Distressed vocalizations	.80			
	2. Facial fear	.73			
	3. Escape	.47			
	4. Latency to first vocalization		.76		
	5. Verbal hesitancy		.74		
	6. Approach			.36	
	7. Latency to first fear response			.40	
	8. Activity decrease				
Variance Explained		26.92%	19.33%	13.76%	60.01%

Note. Kaiser-Meyer-Olkin (KMO) = .61, Barlett's test of sphericity: χ^2 (28) = 245.14, p < .001. Latency to first fear response and Approach were reverse scored. Factor loadings less than .30 were suppressed.

Based on the factor loadings, the first factor represented “most prominent fearful responses”, the second factor represented “vocal fear”, and the third factor represented “less prominent fearful responses”. Since all factors were considered to be critical components of Lab-TAB BI, variables that loaded on any of the three factors (all but activity decrease) were standardized and averaged to form the composite Lab-TAB BI score.

In addition, composite scores for parent-rated BI were obtained by standardizing and averaging scores from TBAQ-social fear, EAS-shyness, and EAS-sociability. Similarly, the maternal NA score was generated by standardizing and averaging BFI-neuroticism, STAI-trait anxiety, CES-D, and PANAS-negative affect scores.

3.1.3 Transformations and Assumptions Testing

The variables were then screened for normality. The composite Lab-TAB BI score, internalizing problems, anxious-depressed problems, and withdrawn problems were positively skewed and square root transformed. The composite maternal NA score was also positively skewed and went through a logistic transformation. All variables were normally distributed after transformation. Additional assumptions for linear modeling were also tested. The data was absent of heteroscedasticity, univariate or multivariate outliers, and multi-collinearity for predictors. Predictor variables including child age, Lab-TAB BI, parent-rated BI and maternal NA were also grand-mean centered.

3.2 Descriptive Statistics and Inter-correlations

Descriptive statistics and bivariate Pearson correlations are presented in Table 3-2. As predicted in hypothesis 1, Lab-TAB BI was moderately correlated with parent-rated BI. Parent-rated BI was also positively correlated with internalizing, anxious-depressed, and withdrawn problems; however, Lab-TAB BI was only significantly associated with anxious-depressed problems. Since maternal NA was positively correlated with parent-

rated BI, partial correlations were also tested to examine the associations between parent-rated BI and internalizing problems. All partial correlations remained significant after controlling for maternal NA (Table 3-2). It was also noteworthy that age was negatively associated with BI, regardless of measurement. Maternal NA was also correlated with child internalizing problems.

Gender differences for BI and behavior problems were also examined. Girls (M = .13, SD = .53, N = 97) showed significantly higher BI than boys (M = -.12, SD = .53, N = 104) only when measured by parent ratings, t (199) = 3.28, p = .001, Cohen's d = .47. No gender differences were found in Lab-TAB BI, internalizing, anxious-depressed, or withdrawn problems.

Table 3-2 Descriptive Statistics, Bivariate Correlations and Partial Correlations

		Bivariate Correlations						
Variables	Mean (*SD*)	1	2	3	4	5	6	7
1. Lab-TAB BI	1.73(.15)	1	.25***	-.20**	.13	.17*	.07	.00
2. Parent report BI	.00(.54)		1	-.21**	.26***	.33***	.23**	.17*
3. Child age	3.86 (1.04)			1	.07	.09	-.02	.04
4. Internalizing problems	2.75(1.19)				1	.83***	.66***	.28***
5. Anxious-depressed problems	1.46(.86)					1	.47***	.22**
6. Withdrawn problems	.95(.78)						1	.16*
7. Maternal NA	.26(.18)							1

	Partial Correlations			
	1	2	3	4
1. Parent report BI	1	.22**	.31***	.21**
2. Internalizing problems		1	.82***	.65***
3. Anxious-depressed problems			1	.45***
4. Withdrawn problems				1

Note. BI = Behavioral Inhibition, NA = Negative Affectivity, *p < .05, **p < .01, ***p < .001. Lab-TAB BI, internalizing problems, anxious-depressed problems, and withdrawn problems were square root transformed. Maternal NA was log transformed.

3.3 Hierarchical Linear Models

3.3.1 Parent-rated Behavioral Inhibition as the Predictor

Three hierarchical linear models were tested (Table 3-3: model 1, 3, & 5) using parent-rated BI to predict internalizing, anxious-depressed, and withdrawn problems. As expected, parent-rated BI, child age, and maternal NA positively predicted broadband internalizing problems and anxious-depressed problem; however, only BI was a significant predictor of withdrawn problems. Neither maternal NA nor age predicted withdrawn problems. The interactions between BI and age were marginally significant (*p*s = .05 to .06) in predicting internalizing problems and anxious-depressed problems in the initial models, but they reached significance after dropping the non-significant BI and maternal NA interactions from the models to avoid multi-collinearity. The final models excluding BI and maternal NA interactions also fit slightly better than the initial models (the differences were around .6 AIC or 2.5 BIC). In addition, no gender effects were found on any of the outcome variables. Patterns of interactions were probed and described in a later section.

3.3.2 Lab-TAB-assessed Behavioral Inhibition as the Predictor

Another three models were tested (Table 3-3: model 2, 4, & 6) using Lab-TAB rated BI as the predictor to the same set of outcomes. As predicted, Lab-TAB BI, age, and maternal NA positively predicted internalizing, but age was not a significant predictor of anxious-depressed problems. Surprisingly, contrary to the findings with parent-rated BI, only maternal NA had a main effect on withdrawn problems. None of the interaction effects were significant, nor the gender effects.

Table 33-3 Final Models of Predictors of Internalizing, Anxious-Depressed, and Withdrawn Problems

	Internalizing Problems		Anxious-Depressed Problems		Withdrawn Problems	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Predictors	Parent-rated BI	Lab-TAB BI	Parent-rated BI	Lab-TAB BI	Parent-rated BI	Lab-TAB BI
Level 1						
BI	.63(.14)***	1.27(.53)*	.57(.10)***	.96(.40)*	.29(.11)**	.32(.37)
Age	.20(.07)**	.15(.07)*	.15(.05)**	.10(.06)	.02(.05)	-.01(.05)
Gender	.18(.15)	.03(.16)	.01(.11)	-.11(.12)	.02(.11)	-.04(.11)
Level 2						
Maternal NA	1.63(.55)**	1.90(.55)***	.76(.38)*	1.01(.38)**	.58(.33)	.71(.34)*
Interactions						
BI x Age	-.27(.13)*	--	-.20(.10)*	--	--	--

Note. BI= Behavioral Inhibition. Standard errors are in parentheses. Non-significant interactions were dropped in the final model and shown as "—", *p < .05, **p < .01, ***p < .001.

3.3.3 Parent-rated Behavioral Inhibition as the Moderator

Consistent with hypothesis 2, parent-rated BI moderated the developmental trajectory of internalizing and anxious-depressed problems (age X BI interaction, see model 1 & 3 in Table 3-3). Since both model 1 and 3 exhibited a similar interaction pattern, model 1 was used as an example to illustrate this moderation effect (Figure 3-1). Similar to what Williams et al. (2009) found, high BI (+1 *SD*) children showed a slower increase rate in development of internalizing problems than low BI children. More specifically, internalizing problems increased significantly with age only in children with low BI (-1 *SD*), $b = .34$, $se = .10$, $t\,(174.79) = 3.52$, $p < .001$ and mean BI, $b = .20$, $se = .07$, $t\,(169.78)$, $p = .004$. This age effect was non-significant in high BI children, $b = .03$, $se = .14$, $t\,(170.16)$, $p = .747$. Even though BI was treated as the moderator in order to examine the developmental trajectory, age could also be viewed as the moderator to the association between BI and internalizing problems. Specifically, high BI children were more likely to have internalizing problems than low BI children only when they are young.

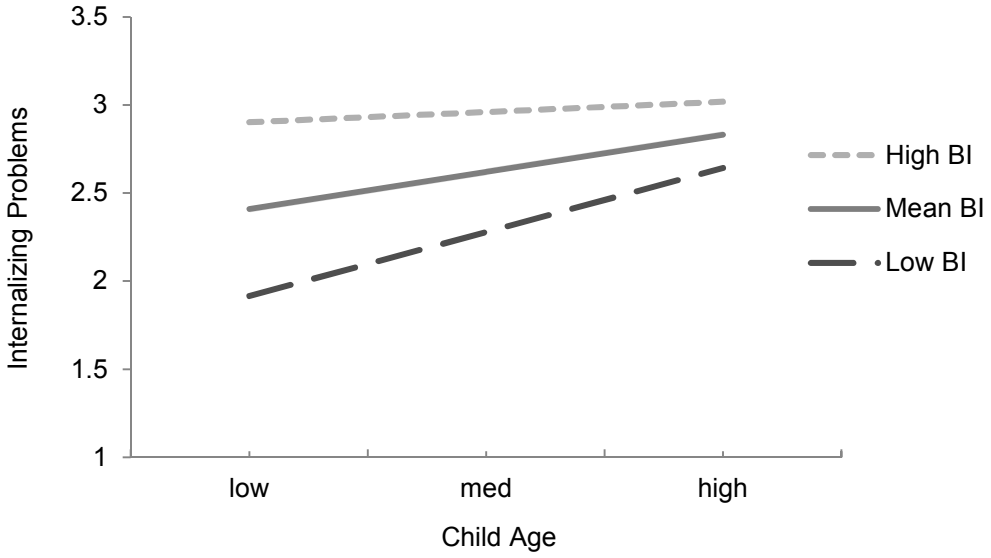

Figure 3-1 Behavioral Inhibition Moderated the Developmental Trajectory of Internalizing Problems.

3.4 Multilevel Mediation Models

To establish the proposed mediational models in hypothesis 3, the first step was to examine if the association between maternal NA and BI (path a) was significant. As expected, maternal NA significantly predicted parent-rated BI, $b = .53$, $se = .25$, t (94.33) = 2.45, $p = .016$; however, maternal NA did not predict Lab-TAB BI ($p > .05$). Therefore, subsequent mediational analyses only included parent-rated BI in the models. In addition, since there was no significant main effect of maternal NA on withdrawn problems (see model 5 in Table 3-3), the mediational model was not tested for withdrawn problems.

3.4.1 Broadband Internalizing Problems as the Outcome

First, the basic 2-1-1 mediational model without age was tested using *Mplus* 7. Hypothesis 3 was supported as a marginally significant indirect effect was found, *estimate* = .26, *se* = .14, $p = .056$, explained 16.46% variance in the total effect. Parent-

rated BI mediated the relationship between maternal NA and internalizing problems. Next, age was introduced to the model as a moderator to the *b* path. The results suggested that the mediational process was conditional in terms of child age (Table 3-4, model 1). Specifically, the indirect effect was significant for younger children (-1 *SD*) and marginally significant t for children at mean age, but it was not significant for older children (+1 *SD*).

3.4.2 Anxious-Depressed Problems as the Outcome

Following the same procedure, a significant mediational effect was also found in the initial model, *estimate* = .26, *se* = .13, *p* = .04, explained 34.67% variance of the total effect. Similarly, by adding age to the model, a moderated mediational effect was also found. Parent-rated BI mediated the relationship between maternal NA and anxious-depressed problems only for younger and children at mean age (Table 3-4, model 2).

Table 3-4 Direct and Indirect Effects in Moderated Mediation Models

	Predictors	Outcomes	Estimate	SE	*p* Value	95% CI
Model 1						
path a	Maternal NA	BI	.53	.25	.03	.05, 1.02
path b1	BI	Internalizing problems	.58	.14	<.001	.32, .85
path b2	Age	Internalizing problems	.19	.07	.008	.05, .33
path b3	BI x Age	Internalizing problems	-.31	.17	.06	-.63, .02
path c (total effect)	Maternal NA	Internalizing problems	1.58	.56	.005	.49, 2.68
Indirect effects:						
a(b1+b3*mean age)			**.31**	**.16**	**.05**	**.00, .62**
a(b1+b3*(+1 *SD* age))			.14	.14	.31	-.13, .42
a(b1+b3*(-1 SD age))			**.48**	**.23**	**.04**	**.03, .94**
Model 2						
path a	Maternal NA	BI	.53	.25	.03	.05, 1.02
path b1	BI	Anxious-depressed problems	.57	.10	<.001	.40, .79
path b2	Age	Anxious-depressed problems	.16	.06	.005	.05. .27
path b3	BI x Age	Anxious-depressed problems	-.24	.11	.04	-.04, -.01
path c (total effect)	Maternal NA	Anxious-depressed problems	.75	.38	.05	.02, 1.50
Indirect effects						
a(b1+b3*mean age)			**.30**	**.15**	**.04**	**.01, .59**
a(b1+b3*(+1 *SD* age))			.17	.12	.16	-.07, .41
a(b1+b3*(-1 SD age))			**.43**	**.20**	**.03**	**.04, .83**

Note. BI = Behavioral Inhibition, NA = negative affectivity. Significant indirect effects were highlighted.

Chapter 4

Discussion

The purpose of the current study was to investigate predictors of internalizing problems in preschool-aged children. The link between child behavioral inhibition and internalizing problems has been well established by previous research, however, few studies have explored the effect of maternal traits (Crawford et al., 2011). Using a family study design, both family and individual level factors were examined. The current study found that child BI mediated the relationship between maternal negative affectivity and child internalizing problems, and this process was dependent on child age. Additionally, a multi-method approach to assess child BI was employed in the current study to reduce potential biases from traditional parent report measures. Specific findings, strengths, and limitations are discussed in this chapter.

4.1 Observed Measures vs. Parent Reports

As hypothesized, observed ratings of child BI were moderately correlated with parent ratings, and this finding was fairly consistent with the literature (Dougherty, Klein, Durbin, Hayden, & Olino, 2010). Interestingly, parent-rated BI was correlated with internalizing problems and all of its related subcategories, but observer rated BI was only significantly correlated with anxious-depressed problems. This suggested that even though both measures were able to capture the essential structure of BI, observed BI might be tailored more specifically to measure the expression of anxiety in social interactions. In addition, maternal negative affectivity level did not influence the link between parent ratings of BI and child internalizing problems as the partial correlations remained significant.

Girls showed higher levels of parent-rated BI than boys, but there were no gender differences in observed BI (though it had a same trend that favored towards girls).

This finding was somewhat surprising, as previous studies have reported similar gender differences in BI with both observed measures and parent reports (Olino, Klein, Dyson, Rose, & Durbin, 2010; Gagne, Miller, & Goldsmith, 2013). The null finding in the current study might be due to sample bias.

4.2 Predictors of Internalizing Problems

Regardless of measurement method, child BI positively predicted internalizing and anxious-depressed problems; however, observed (Lab-TAB) BI had noticeably lower predictive power than the parent ratings. This was particularly evident when BI was used to predict withdrawn problems, in which the observed measure did not yield a significant result. This difference could be attributed to the fact that mothers rated both BI and internalizing problems, or because the observed assessment was limited to a one time observation. Therefore, for future research, it is important to implement a more objective measure of child internalizing problems and to have multiple observed assessments for child BI.

Additionally, age also positively predicted internalizing and anxious-depressed problems but not withdrawn problems. This was consistent with previous research (Williams et al., 2009), although the present study had a stricter age range (2.5 to 5.5). Similarly, Williams et al. (2009) found a significant interaction between age and child BI with their observed measure; however, this interaction was only detected with parent-rated BI in the current study even though the interaction patterns were similar. As hypothesized, children with high BI showed greater internalizing problems than low BI children initially, but their problems tend to increase much slower than low BI children. In other words, children with low BI had fewer internalizing problems earlier, but the rate of increase was much greater than for high BI children. Even though the current study did not observe an interaction point between high and low BI children, the Williams et al.

(2009) study suggested that at approximately 11.5 years of age, low BI children would start showing even higher internalizing problems than high BI children. However, this age X BI interaction may be much more complicated than it seems. Many research findings suggest that high social withdrawal/high BI children are at higher risk for becoming targets of peer victimization and developing social anxiety; however, decreases in withdrawal behaviors are also prevalent if high BI individuals experience less peer inclusion (Rubin, Coplan, & Bowker, 2013). In addition, one might argue that the tendency to withdraw from stressful social situations could reduce their exposure to negative relationship experiences, which in turn leads to fewer internalizing problems. Other factors, such as parenting, school environment, and individual resilience could also influence the developmental trajectories of both BI and internalizing problems (Rubin et al., 2013). Longitudinal studies are needed to further explore the developmental paths.

Finally, maternal negative affectivity also positively predicted internalizing and anxious-depressed problems. This finding provides further evidence that maternal traits could affect behavioral problems in their children. Since most previous research focused on narrow constructs such as maternal depressive symptoms and trait anxiety, this new finding provides a fresh insight for future research.

4.3 The Conditional Mediating Effect of Behavioral Inhibition

The underlying process of the relationship between maternal NA and child internalizing problems was further investigated by modeling BI as a mediator. Surprisingly, maternal NA was not a significant predictor of observed child BI. This may be due to the fact that child BI was assessed only at one point with a single episode in the lab. However, as expected, parent ratings of BI mediated the relationship between maternal NA and child internalizing and anxious-depressed problems, and these

mediating effects were particularly significant for younger children (-1 *SD,* around 2.8 years in the current sample).

This conditional mediating effect could be explained by the following model: mothers who are prone to experience negative affects/emotions are more likely to have children with high behavioral inhibition, and these high BI children are more likely to develop internalizing problems. Moreover, with the significant age X BI interaction found in response to hypothesis 2, younger children with high BI were particularly vulnerable to develop internalizing problems, and this moderating effect of age presumably strengthened the mediating effect of BI at early years.

Since the total effect of maternal NA on child internalizing problems were only partially mediated by child BI, another possible explanation is that younger children are less exposed or less likely to respond to other environmental factors that could become potential mediators between maternal NA and internalizing problems, such as maladaptive parenting, poor family functioning, and negative peer relationships. Therefore, in early childhood, BI characterized as a temperamental trait inherited from mothers may play a major mediating role in developing internalizing problems; however, for older children, the process would be much more complicated with additive or interactive effects from various environmental factors.

4.4 Strengths, Limitations, and Future Directions

One major strength of the current study is that it included both observed and parent report measures of behavioral inhibition. Most studies used either only observed measures or parent ratings. Using the multi-method approach and comparing the results provided a good basis for what to expect with different assessment methodologies in the future. The results suggested that parent-rated BI was more likely to generate significant findings with better predictive powers than observed BI; however, these findings need to

be interpreted with caution as they could be subject to potential rater biases. In addition, the observed BI findings suggested that validity might be a concern if only observed measures were used, because some significant effects may go undetected. This also leads to the first major limitation of the present study, where laboratory BI assessment was only conducted at a single time with one episode. Even though one would argue that observed measures are genuinely superior to parent reports due to objectivity, it is impossible to rule out the experimenter effects, the novelty of the laboratory, and any other background factors (Goldsmith & Gagne, 2012; Pfeifer et al., 2002). Future studies should consider including multiple types of BI assessments at different time points along with parent reports.

Another strength is that the wide age range in the study sample made it possible to account for age in the mediation models with the cross-sectional data; however, these results did not reflect actual developmental trajectories. For future research, it is important to gather longitudinal data to provide a clearer illustration of the developmental path for child behavior problems. Meanwhile, the wide age range could also be a limitation to the current study. The statistical power was relatively low to draw confident conclusions on any particular effects that detected at a specific age.

Finally, this is the first study that examined maternal negative affectivity and its impact on children. Emphasizing broad trait-like characteristics over specific mental health symptoms might help clinical practitioners to implement intervention programs at earlier stages, because some at-risk mothers with high levels of negative affectivity might not necessarily show specific symptoms of any diagnosable mental disorders. As one would expect, more research is needed to further examine the impact of maternal NA on child development. In the current study, only one mediator was tested to uncover the association between maternal NA and child internalizing problems. Future investigations

should employ more complex models with multiple mediators/moderators (parenting styles/practices, family environment, peer relationship quality, etc.) to provide a more complete presentation of this mother-child association.

Appendix A

Sample Lab-TAB Stranger Approach Coding Sheet

FEAR: STRANGER APPROACH Coding Sheet – TEXAS Family Study

Subject # _____ S1 S2 Coder _____
Experimenter _____ Date Coded _____
DOV Episode Order _____

Stranger Code _____ Baseline _____

Parent/Adult Interference _____ Counter start time _____

Latency to first fear response _____ (___)

Latency to first vocalization _____ (___)

Epochs	Epoch 1	Epoch 2	Epoch 3	Epoch 4	Epoch 5	Epoch 6	Epoch 7	Epoch 8
Stranger's Behavior	Str knocks, Q1: "Been here before?"	10 sec. Pause	Q2: "Having fun?" + 10 sec.	Q3: "Playing w/ toys?" + 10 sec.	Q4: "Favorite toy?" + 10 sec.	10 sec. Pause	Str asks for papers, C's response	Door opens, str. leaves + 15 sec.
Start Times								
Intensity of Facial Fear(ff) (0-3)								
Intensity of Vocal Distress (dv) (0-3)								
Intensity of Activity Decrease (ad) (0-3)								
Intensity of Approach (ap) (0-3)								
Intensity of Escape (av) (0-3)								
Intensity of Verbal								

Hesitancy (vh) (0-2)								
Nervous Fidgeting (nf) (0-1)								
Smile or Laughter (0–1)								

Frequency of nervous fidgeting ____/____

Frequency of smile or laughter ____/____

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