FEAR AS A FACTOR IN THE DEVELOPMENT OF CHILDHOOD PSYCHOPATHOLOGY

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A dissertation submitted in partial fulfillment of
the requirements for the degree of

DOCTOR OF PHILOSOPHY

WASHINGTON STATE UNIVERSITY
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AUGUST 2007

To the Faculty of Washington State University:

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ACKNOWLEDGMENT

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Abstract

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August 2007

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This study explores the relationship of one specific aspect of infant temperament, namely fear, and its relationship to the development of psychopathology at toddler age. Fear was assessed in the laboratory and via maternal report when infants were 12 months old and related to the development of internalizing and externalizing behavior problems between 18 and 35 months of age. It was found that fear as reported by the mother was significantly correlated with the development of internalizing behavior problems. Furthermore, it was examined whether Effortful Control and Orienting/Regulatory Capacity would mediate the significant relationship between fear and internalizing symptoms. Orienting/Regulatory Capacity was assessed via parental report when the infant was 12 months of age, while Effortful Control was assessed via maternal report at toddler age. Although, it was found that neither variable functioned as a mediator in independent models, results indicated that both variables together partially mediated the relationship between reported fear and internalizing symptoms. Hence, factors related to effortful control explained part of the relationship between fear and the development of later internalizing behavior problems.

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Dedication

This dissertation is dedicated to my husband Sean whose love and support were a great help

throughout my graduate training and in the completion of this project.

CHAPTER ONE

Introduction

Overview of Study

Child temperament research is a relatively recent endeavor. According to Rothbart and

Bates (1998), research by child developmental scientists in the 1920s and 30s preceded and

contributed to the research conducted by later child temperament researchers. Since there is such

a limited history of this line of research there are still many unanswered questions. Specifically,

studying the development of temperament characteristics over time has been an object of more

recent study (e.g., Côté, Tremblay, Nagin, Zoccolillo, & Vitaro, 2002; Lemery, Goldsmith,

Klinnert, & Mrazek, 1999; Scarr & Salapatek, 1970). Furthermore, researchers have also started

to link certain aspects of childhood temperament to psychopathology (e.g., Colder, Mott, &

Berman, 2002; Goldsmith & Lemery, 2000; Kagan, Snidman, Zentner, & Peterson, 1999;

Oldehinkel, Hartman, De Winter, Veenstra, & Ormel, 2004). Fear is one of the temperament

constructs that has been linked to different types of psychopathology. It has been found to be

related to internalizing, as well as externalizing disorders (e.g. Goldsmith & Lemery, 2000;

Oldehinkel et al., 2004). Thus, fear appears to be an aspect of temperament that has an especially

consistent relationship with the development of psychopathology. This study attempts to further

explain the relationship between fear and the development of behavior problems.

Temperament

Defining Temperament

Two prominent researchers in the field of temperament refer to this set of attributes as

"constitutional differences in reactivity and self-regulation" (Rothbart & Derryberry, 1981, p.

37). They define reactivity as the "characteristics of the individual's reaction to changes in the

environment, as reflected in somatic, endocrine, and autonomic nervous systems" (p. 37) and self-regulation as the "processes functioning to modulate this reactivity, e.g., attentional and behavioral patterns of approach and avoidance" (p. 37). Thus, Rothbart and Derryberry (1981) conceive of temperament as being partly biologically determined, as can be seen by their definition of reactivity. However, they also discuss environmental influences on temperament, when they state that the constitutional basis of temperament refers to "the relatively enduring biological makeup of the organism influenced over time by heredity, maturation, and experience" (p. 37). Hence, they stress the interplay of biological and environmental factors in the development of temperament. However, when considering the views of major temperament researchers in general, there is disagreement between them about the specific aspects that make up temperament (Goldsmith et al., 1987). In a roundtable discussion they could only agree that activity level and emotionality should be two of the aspects constituting temperament (Goldsmith et al., 1987). The disagreements will hopefully be resolved in the future by increased communication between the major researchers in the field and the continuation of temperament research.

Thomas and Chess are two of the most prominent early researchers of childhood temperament. After interviewing the parents of infants, they proposed that early temperament consisted of nine dimensions including Activity Level, Rhythmicity, Adaptability, Approach-Withdrawal, Mood, Intensity, Attention Span-Persistence, Distractibility, Threshold of Responsiveness (Thomas, Chess, Birch, Hertzig, & Korn, 1963). Rothbart (1981) on the other hand, found six dimensions of temperament while designing the Infant Temperament Questionnaire (IBQ). These six dimensions were Activity Level, Smiling and Laughter, Fear, Distress to Limitations, Soothability, and Duration of Orienting (Rothbart, 1981). After the

questionnaire was revised, fourteen aspects of temperament were established, namely High Intensity Pleasure, Perceptual Sensitivity, Vocal Reactivity, Activity Level, Approach, Smiling and Laughter, Low Intensity Pleasure, Cuddliness/Affiliation, Soothability, Duration of Orienting, Sadness, Fear, Distress to Limitations, and Falling Reactivity (Gartstein & Rothbart, 2003). Thus, it becomes apparent that the number and type of temperament dimensions have been revised over time, and vary as a function of a particular theoretical approach.

Development of Temperament

Although there are some differences in exactly how temperament is defined, researchers in general have found that infant temperament is less stable than later temperament (e.g., Lemery et al., 1999; Pedlow, Sanson, Prior, & Oberklaid, 1993; Wilson & Matheny, 1986). In the study conducted by Lemery et al. (1999), temperament was assessed from the age of 3 months until 48 months at different intervals. The mothers of the infants would complete two or three different temperament measures at each assessment point. The questionnaires used for the study included the IBQ, the preliminary version of the Toddler Behavior Assessment Questionnaire (TBAQ; Goldsmith, 1996), the Infant Characteristics Questionnaire (ICQ; Bates, Freeland, & Lounsbury, 1979), the Revised Infant Temperament Questionnaire (RITQ; Carey & McDevitt, 1978), the Toddler Temperament Scale (TTS; Fullard, McDevitt, & Carey, 1984), and the Behavioral Style Questionnaire (BSQ; McDevitt & Carey, 1978; BSQ; McDevitt & Carey, 1978). According to Lemery et al. (1999), stability increased across all aspects of temperament by the time the infants were 24 months of age.

The fact that stability of temperament increases over time may be caused by the development of temperament. Not all aspects of temperament are fully developed when the infant is born. Rothbart (1989), for example, reports that the positive emotionality cluster of

temperament is missing during the newborn phase, only Distress and Soothability, Orienting and Alertness, Activity, and Approach-Withdrawal can be observed during that time. However, once the infant is three months old the positive emotionality cluster becomes observable and continues to intensify over the first year of life (Rothbart, 1989). Furthermore, Fear, Inhibition of Approach, and Effortful Control are all temperament dimensions that increase during the later part of infancy (Rothbart, 1989). The increase in Fear occurs during the second part of the first year of life (e.g., Rothbart, 1986, 1988) when Inhibition of Approach develops (Rothbart, 1988). Some aspects of temperament also develop according to a U-shape trajectory. Both Anger and Duration of Orienting have been reported to follow this developmental curve (Carnicero, Pérez-López, Salinas, & Martínez-Fuentes, 2000). Anger decreases between the ages of two to six months, which might be linked to the increase in the ability to shift attention (Johnson, Posner, & Rothbart, 1991). Duration of Orienting, on the other hand, has been shown to decline between six and nine months, possibly as a function of emergence of more advanced attention mechanisms (i.e., executive attention; Carnicero et al., 2000). Thus, it becomes evident that temperament undergoes considerable changes during the period of infancy that need to be taken into consideration when conducting research.

Development of Fear

Thus far, the relationship between the temperament construct of fear to externalizing disorders, internalizing disorders, conscious development, and guilt have been briefly addressed. Before the relationship between fear and psychopathology will be discussed any further, it is of importance to specifically address the development of fear. To be able to conduct sound research using infant fear as a predictor, it is necessary to understand how temperament develops. Scarr and Salapatek (1970) conducted a cross-sectional study of the development of fear between the

ages of 2 and 24 months. Only about one third of infants were examined longitudinally over a two months period. They found that infants under the age of 7 months did not show any stranger fear. However, as they got older their fear of strangers increased and leveled off between the ages of 11 to 18 months. When the fear of strange masks was studied, a curvilinear relationship was found, in that the fear response started around 7 months of age, increased until the end of the first year and then decreased again during the second year of life. The development of fear of a visual cliff, however, showed a linear trend. Infants under the age of seven months showed few fear responses to the cliff, but by 13 months of age almost all infants showed strong fear reactions to the cliff. This measure of fear was related to the motor development of the infants. Those infants who were not yet able to crawl appeared unafraid of the visual cliff. Furthermore, experience with either walking or crawling influenced fear of the visual cliff. Those infants who had only been either walking or crawling for a short period of time were more afraid to cross. Fear responses in regard to sudden events were also studied, and it was found that the fear of sudden events peaks during the second half of the first year of life and then decreases again during the second year of life. These findings are generally in agreement with the results of other researchers demonstrating overall fearfulness grows during the second part of the first year of life (Carnicero et al., 2000; Rothbart, 1986, 1988). Researchers examining later development of fear have found that fearfulness was generally stable between kindergarten and the sixth grade (Côté et al., 2002).

Sex Differences in the Development of Fear

It has also been found that there are differences in the development of fear responses in boys and girls (Nagy et al., 2001). Mother-report indicated that boys displayed facial fear about 6 days later than girls. Most mothers also noted that the first facial fear response was displayed in

response to a loud sound or an abrupt movement. Generally, it was found that facial fear expressions developed towards the end of the first month of life, although the coherent constellation of fearful responses did not emerge until later in the first year of life. Other studies have indicated that girls report increased fears to different stimuli as opposed to boys (Sidana, 1967), and that there is a significantly greater proportion of girls as opposed to boys who are high in fearfulness, while there was a greater proportion of boys who were average in fearfulness (Côté et al., 2002). Both of these studies have been conducted with older children. Sidana (1967) used a sample of children between the ages of 6 to 12 years of age, while Côté et al. (2002) assessed fear yearly in children from kindergarten age until grade six. Thus, it appears that there are already some differences in the development of fear in early infancy, which continue to be expressed into childhood, with girls displaying more fears than boys. Gartstein and Rothbart (2003) have studied the development of temperament cross-sectionally in infants between the ages of three to twelve months to develop a revision of the IBQ (Rothbart, 1981). Their results indicated that female infants were rated by their parents to be higher in fear than male infants, supporting the findings of previous research.

Temperament and Psychological Adjustment

Even though temperament still undergoes changes during infancy, infant temperament has been linked to the development of psychopathology. Chess and Thomas (1990), for example, have linked temperament and global adjustment from the age of one to the age of five. Furthermore, they have been able to demonstrate that "easy temperament" measured by the age of three was related to better adjustment during early adulthood, which was considered the period between 18 and 24 years of age (Chess & Thomas, 1990). Another group of researchers was able to relate infant activity level and fear to early childhood psychopathology (Colder et al.,

2002). Specifically, it was found that decreased levels of fear combined with an increased activity level predicted higher levels of externalizing and depressive symptoms in boys, but not in girls. It was also found that decreased levels of fear in girls were related to an increased number of internalizing symptoms. Furthermore, girls who were more fearful and less active showed a decrease in internalizing symptoms. Both findings for this group were unexpected and the authors emphasize that they should be regarded with caution. In addition, it has been shown that children were more susceptible to anxious symptoms at the age of seven if they had been high reactive infants at the age of four months (Kagan et al., 1999). Kagan et al. (1999) define high reactivity as showing a "combination of frequent, vigorous motor activity combined with frequent fretting and crying" (p. 209). Thus, there is evidence that infant temperament can be used to predict psychological adjustment years later, as well as potential gender differences that require further study.

Most research linking early temperament and later psychopathology has been done with children of toddler age or above. The relationship between effortful control and the development of later behavior problems and adjustment, for example, has been widely studied in this post-infancy period (e.g., Eisenberg et al., 2004; Kochanska, DeVet, Goldman, Murray, & Putnam, 1994; Kochanska & Knaack, 2003; Kochanska, Murray, & Coy, 1997; Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996; Murray & Kochanska, 2002). Effortful control has been defined as "the ability to inhibit a dominant response to perform a subdominant response" (Rothbart & Bates, 1998, p. 137). Furthermore, it has been stipulated that effortful control refers to voluntary control, as opposed to just reactive control (Eisenberg & Morris, 2002). This type of control has been shown to be directly related to externalizing problems and resiliency, as well as indirectly to internalizing problems (Eisenberg et al., 2004). There was a negative relationship

between effortful control and externalizing problems, and the relationship between effortful control and internalizing problems was mediated by resiliency (Eisenberg et al., 2004). Specifically, children with lower effortful control demonstrated lower levels of resiliency, and lower levels of resiliency were in turn related to increased internalizing problems. Furthermore, effortful control has been linked to the development of a conscience (e.g., Kochanska et al., 1994; Kochanska & Knaack, 2003; Kochanska et al., 1997) and associated with it the internalization of rules (Kochanska et al., 1996); thus, suggesting that higher effortful control provides a foundation for better adjustment later in childhood. Conscience development and feelings of guilt have also been linked to the temperament construct of fear (Kochanska et al., 1994; Kochanska, Gross, Lin, & Nichols, 2002; Rothbart, Ahadi, & Hershey, 1994). It has been shown that more fearful children exhibit increased levels of guilt, and guilt proneness mediated the relationship between fearful temperament and the tendency to break rules (Kochanska et al., 2002). Furthermore, mother reported fearfulness and arousability were associated with conscience development in girls (Kochanska et al., 1994). Two aspects of temperament were examined in this study, namely "Affective Discomfort" and "Active Moral Regulation/Vigilance." "Affective Discomfort" encompasses feelings of guilt, feelings of remorse, apology, empathy, and concern about parental feelings and forgiveness, while "Active Moral Regulation/Vigilance" entails confessions, internalized conduct, reparation, and concern about the misbehaviors of others (Kochanska et al., 1994). The findings of the study indicated that increased fearfulness and arousability in girls were associated with increased "Affective Discomfort" and decreased "Active Moral Regulation/Vigilance." There were no findings relating fearfulness to conscience development in boys. Rothbart et al. (1994) have been able to demonstrate that fear as assessed in infancy related to guilt when the child was six years of age.

Thus, early temperament, and fearfulness in particular, have been shown to predict the traits that are of relevance for healthy adjustment for the rest of a person's life. It is necessary to internalize rules, feel guilt, and have a conscience to feel a necessity for following society's rules. Thus, fearfulness appears to serve as a protective factor at times.

Fear and the Behavioral Inhibition System (BIS)

The BIS

Since research related to fear often makes links to the concept of behavioral inhibition, it is of importance to discuss this concept in more detail. The BIS is one of "three fundamental emotion systems," (Gray, 1991, p. 109) including the BIS, the behavioral approach system (BAS), and the fight/flight system, and it has been associated with the emotion of anxiety (Gray, 1991). Gray (1991) explains that the BIS is sensitive to signals of nonreward, punishment, and novel stimuli. Once these signals are received, the BIS would then cause the person to cease (i.e., inhibit) their current action, which might only last for an instant (Gray, 1987). Next, there is an increase in attention, such that the person is paying particular attention to any new stimuli in the environment (Gray, 1987). An increase in arousal follows that leads to continuing the previously discontinued action or perform a different action with amplified energy or speed (Gray, 1987). Gray (1991, 1994) remarks that a person who has a stronger BIS, as compared to the BAS, namely an introvert, should be more punishment respondent. Thus, an introvert should show increased learning and performing when punishment as opposed to reward is used (Gray, 1994). Hence, it appears that once the BIS is activated, attention in general is increased and not just attention to cues of punishment and non-reward, since Gray discussed that punishment enhances learning ability in those people who have a stronger BIS. However, as is discussed by Gray (1982) benzodiazepines, barbiturates and alcohol act on the BIS, which also presented a starting

point for developing the concept of the BIS. These drugs interfere with the behavioral effects that a person usually displays in reaction to signals of nonreward, punishment, and novel stimuli (Gray, 1982). That is, these drugs interfere with the inhibition which would naturally occur given such signals. Gray (1982) notes that the concept of the BIS has been derived from animal models, but is also a plausible mechanism for explaining human anxiety. Linked to the septo-hippocampal system (Gray, 1982), the BIS has also been conceptualized as "an anxiety system whose function is to inhibit behavior that would otherwise occur in response to cues or conditioned stimuli for response-contingent punishment (passive avoidance in an approach avoidance conflict) and/or frustrative nonreward (early stages of extinction)" (Fowles, Kochanska, & Murray, 2000, p. 777). Thus, it appears that Fowles et al. (2000) see the BIS as interfering with approach responses that are likely to happen in response to a specific cue due to the sensitivity to punishment. Furthermore, their conceptualization implies that the person who does not exhibit any active avoidance behavior, but simply avoids by not approaching, engages in passive avoidance. In addition, they mention that the BIS inhibits continued responding in a frustrative nonreward context, which then represents the early stages of extinction since the person stops responding to stimuli once the rewards are stopped.

Fear and the BIS

In the literature, the temperament construct of fear has been linked to the BIS and general inhibition, since the BIS is conceptualized as an "anxiety system" (Fowles et al., 2000, p. 777). Kagan (1967), for example, discusses that more inhibited children are highly anxious about failure, while those lower in inhibition are less anxious. Kagan (1982) also uses the terms inhibition and fearfulness interchangeably, thus, apparently indicating that they are the same. However, Kagan (1967, 1982) discusses general inhibition and does not refer to Gray's BIS.

Another group of researchers was able to link behavioral inhibition to increased negative affect and a ruminative response style (Leen-Feldner, Zvolensky, Feldner, & Lejuez, 2004). Fowles et al. (2000), also conducted research relating to Gray's BIS, studying whether individual divergences in electrodermal activity (EDA) are due to differences in the BIS. Two temperament concepts were used to reflect the BIS, namely fearfulness and effortful control. Thus, the BIS was conceptualized in a manner that went beyond the temperament construct of fear by additionally incorporating the regulatory component (i.e., effortful control), since inhibitory control is needed to suppress responses in reaction to punishment and/or frustrative nonreward (Fowles et al., 2000). These researchers hypothesized that lower EDA would be associated with decreased fearfulness and/or decreased effortful control, finding some support for this hypothesis. Specifically, EDA was related to both fearfulness and effortful control in the predicted direction, when both were measured at preschool age, meaning that lower EDA was associated with decreased fearfulness and decreased effortful control. However, temperament as assessed at toddler age was not correlated with EDA during the preschool period. Overall, it was concluded that fluctuations in EDA are due to differences in the BIS since EDA was related to both factors that have been conceptually linked to the BIS, namely fear and effortful control.

Fear and Psychopathology

Fear and its Relationship to Internalizing Disorders

Thus far, findings regarding the development of fear and related concepts were reviewed. Now, findings regarding fear and its relationship to internalizing psychopathology will be discussed. Since fearfulness has been conceptualized as part of the BIS-related behavioral manifestations (Fowles et al., 2000), and Kagan (1982) has used the terms fearfulness and

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inhibition interchangeably, the findings discussed here will include those relating the BIS and inhibition to internalizing disorders.

Link to depressive symptoms. One study has linked the BIS to depression, as well as anxiety disorders (Johnson, Turner, & Iwata, 2003). Johnson et al. (2003) conducted a diagnostic interview with their 19 to 21-year-old participants and asked them to complete a self-report scale assessing functioning of the BIS and BAS. Results indicated that higher BIS-related scores were associated with a higher probability of a lifetime diagnosis of anxiety. Furthermore, higher BIS scores were associated with the probability of a lifetime depression diagnosis, even after controlling for comorbid anxiety. Thus, this study provides evidence for a concurrent association between BIS and internalizing disorders.

Another study examined the concurrent associations between the BIS functioning and mood symptoms (Meyer, Johnson, & Carver, 1999). The object of this study was to determine whether the BIS and the BAS would be linked to bipolar symptomatology. A college age normal population was used in the context of this study, and it was found that increased BIS scores were associated with increased symptoms of depression. However, BIS-related scores were not associated with symptoms of hypomania.

Fear has also been studied as a moderating variable (Colder, Lochman, & Wells, 1997) with a group of 64 fourth and fifth grade boys and their parents. It was of interest whether fear and/or activity level would moderate the relationship between parenting practices and childhood symptoms of aggression and depression. One of the findings was that fear moderated the relationship between parental discipline and depressive symptoms. Specifically, harsh discipline was related to depressive symptoms in children who had high levels of fear, but not in those who had low levels of fear. Furthermore, overinvolved parenting was also related to an increase in

depressive symptoms if the children were high in fear. Thus, suggesting that high fear might serve as a risk factor for the development of psychopathology. However, further study is needed since this study was not longitudinal, which means that it is unclear whether high fear levels preceded psychopathology or not.

Pine, Cohen, and Brook (2001) studied how the level of fear during adolescence would be associated with later major depression. The participants were studied over a period of 9 years using three assessment points. Adolescent and parent report were used to assess psychopathology during the first two assessments, while only adolescent report was used to assess psychopathology at the last follow-up. Both parents and adolescents also provided ratings on fear scale and rated the adolescents' fear of the dark. The fear scale was created by adding positive responses from the specific phobia module of a diagnostic interview. Results showed that the level of specific fears predicted major depression two to three years later, while fear of the dark predicted major depression nine years later. It is unclear, why fear of the dark did not predict major depression at the two to three year follow-up, but the authors suspected that it may be due to low rates of depression at this time point. This study once again supports the notion that high levels of fear are associated with increased internalizing psychopathology, even when studied in a longitudinal time frame and not just concurrently.

Another longitudinal study examined the interactive effects of fear and activity level on childhood psychopathology (Colder et al., 2002). In this study, temperament was assessed by parental report when the child was between one and eleven months of age. Externalizing and internalizing symptoms were also assessed via parental report when the children were four, six, and eight years old. Regarding the internalizing symptoms, Colder et al. (2002) found that high levels of fear and a low activity level in boys predicted increased symptoms of depression, but

not anxiety. However, it was also found that for boys, low levels of fear in association with high activity levels predicted increased depressive symptoms. The results for the girls indicated that a decreased level of fear was associated with increased levels of both depressive and anxiety symptoms, which was in the opposite direction of the authors predictions. Thus, they note that the findings need to be replicated before their veracity can be concluded.

Fearfulness has been shown to predict depression, as well as social phobia in a study examining the relationship between different aspects of behavioral inhibition, depression, and social phobia (Hayward, Killen, Kraemer, & Taylor, 1998). Hayward et al. (1998) used a retrospective self-report measure to assess behavioral inhibition. They found that there were three components of behavioral inhibition in their sample, namely fearfulness, social avoidance, and illness behaviors in childhood. Self-report measures, as well as structured interviews were used to assess psychopathology in a normal high school population. Their finding pertinent to this review indicated that fearfulness predicted both social phobia, as well as depression in males and females. Thus, the authors conclude that childhood fearfulness acts as a nonspecific risk factor. However, the fearfulness measure in this study required a retrospective self-report, and this report may be influenced by the adolescent's current state of mind making it less accurate than had it been assessed directly during the preceding childhood period. Thus, the studies reviewed so far support the notion that fearfulness is a risk factor for the development of depression. The longitudinal studies strongly suggest that the risk factor of fearfulness is present before the psychopathology develops.

Link to anxiety symptoms. A review paper by Goldsmith and Lemery (2000) discussed results provided by Lemery's earlier work indicating that fear as assessed by the Children's Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hersey, & Fisher, 2001) was consistently

positively correlated with symptoms of separation anxiety and overanxiousness, both concurrently and longitudinally. Kagan et al. (1999) also found a relationship between fearfulness and the development of anxious symptoms. When studying the relationship between high and low reactivity and symptoms of anxiety, Kagan et al. (1999) found that high reactive infants were more prone to develop symptoms of anxiety. More importantly in the context of this review, those children who were highly reactive and developed anxiety symptoms were compared to those that did not, and it was found that those children who developed symptoms by the age 7 had been more fearful in the laboratory at the age of 21 months; thus indicating that temperamental fearfulness was associated with a greater risk for developing later internalizing psychopathology.

Another study examined the relationship between psychopathology and behavioral inhibition in children who had parents with diagnoses of panic disorder and agoraphobia and children of parents who did not meet the diagnostic criteria for these disorders (Biederman et al., 1990). Two sets of independent preexisting samples were used in the context of this study. The first set consisted of an at-risk sample consisting of 30 children whose parents were in outpatient treatment for panic disorder and agoraphobia. These 30 children underwent a laboratory evaluation to measure behavioral inhibition and on the basis of the assessment were placed in either an inhibited (N = 18) or not inhibited (N = 12) group. Furthermore, there was control group (N = 20) of children, who had no known psychiatric or medical disorders. For both sets of samples, it was determined how likely the children were to meet criteria for Major Depression, Attention Deficit Disorder, Oppositional Disorder, Overanxious Disorder, Phobic Disorders, Separation Anxiety Disorder, and Avoidant Disorder. In addition, it was of interest how likely the children were to meet criteria for four or more disorders and for two or more anxiety

disorders. The inhibited children were more likely to meet criteria for four or more disorders than the healthy controls. Furthermore, they were also more likely to have two or more anxiety disorders, to have an oppositional disorder, and to have overanxious disorder. However, no differences were found between the inhibited group and the not inhibited group, which the authors attributed to the small sample size of these groups. For the second sample set, children who had been assessed for behavioral inhibition at 21 months were used. The follow-up to assess psychopathology was conducted when the children were between seven and eight years of age. The mothers of 41 children who had been determined to be either inhibited or uninhibited completed the diagnostic interview. Findings indicated that inhibited children had a significantly lower rate of oppositional disorder, and a significantly higher rate of phobic disorders than uninhibited children. Hence, support was found for the notion that behavioral inhibition not only co-occurs with anxiety disorders, but also precedes them and can be seen as a risk factor for their onset. However, the findings also implicate that behavioral inhibition may serve as a protective factor from developing externalizing symptoms.

After three years, a follow-up study of the previously described research project was conducted (Biederman et al., 1993; Biederman et al., 1990). Just as in the previous study structured interviews were used to assess child psychopathology (Biederman et al., 1993). However, in the context of the new follow-up investigation the data from the two sample sets were pooled and not just examined separately. Findings showed that inhibited children continued to have higher rates of multiple anxiety disorders and avoidant disorder (avoidant disorder is a childhood anxiety disorder classified in the Diagnostic and Statistical Manual of Mental Disorders, Third Edition; DSM-III; American Psychiatric Association, 1980). However, there were no significant differences between the inhibited and the not-inhibited group at the follow-

up when phobic disorders were considered, as had been the case for the baseline assessment. Differences in rates of separation anxiety between the inhibited and the not-inhibited group increased and became significant at the follow-up and significant differences were found between the two groups for the rates of agoraphobia. Hence, this follow-up provides more longitudinal support for the relationship between behavioral inhibition and anxiety disorders.

Another research project was conducted as a follow-up to the formerly discussed studies (Biederman et al., 1993; Biederman et al., 1990) to clarify whether behavioral inhibition would be a specific risk factor for the development of anxiety disorders or any particular anxiety disorders or whether it would be a nonspecific risk factor for any psychopathology (Biederman et al., 2001). Behavioral inhibition was assessed via a laboratory task, while psychopathology was determined via maternal report. The participants were children between the ages of 2 and 6 whose parents had been diagnosed with panic disorder and/or major depression and children of parents who had neither panic disorder nor major depression. The design of the study was cross-sectional and not longitudinal. Findings of this study indicated that behavioral inhibition was specifically related to avoidant disorder and social phobia. However, in contrast to results discussed in the previous section no support could be found for a relationship between behavioral inhibition and mood disorders, but it was shown that children with behavioral inhibition were significantly less likely to have any disruptive behavior disorders. Thus, this study supported that notion that behavioral inhibition is a specific risk factor for avoidant disorder and social phobia. Particularly, the strongest link between behavioral inhibition and social anxiety was found in children whose parents had panic disorder. The fact that no link could be established between behavioral inhibition and depression could be partially due to the sample, as 151 of the children had parents with panic disorder, 49 children had parents with major depression, but no panic

disorder, and 84 children had parents with neither depression nor panic disorder. That is, the link between behavioral inhibition and anxiety could have been partially due to the home environment for most of the children, since they were exposed to anxiety disorders on a daily basis at home. Thus, the children may model some of the anxious behavior they see in their parents. Far fewer children in the study were only exposed to depression at home. Hence, it would be more difficult to have any significant findings for the latter diagnostic category. Furthermore, since more children had parents with an anxiety disorder, there is a greater likelihood for the genetic transmission of anxiety rather than depression. In addition, no longitudinal link between behavioral inhibition and anxiety disorders was established in this study. Thus, it is unclear if the behavioral inhibition was a precursor of the anxiety disorder, if it co-occurred, or if it may have been an outcome of the anxiety disorder.

The stability of behavioral inhibition has also been explored as a risk factor for the development of anxiety disorders (Hirshfeld et al., 1992). In this study, one of the same samples that was in the previously described research (Biederman et al., 1993; Biederman et al., 1990) has been used. This sample initially examined by Hirshfeld et al. (1992) consisted of 41 children that were found to be either extremely inhibited or uninhibited at the age of 21 months. These children were followed longitudinally and assessed for inhibition at the ages of 4, 5½, and 7½. Those children who were inhibited during all four assessments were classified as Stable Inhibited, while those who were uninhibited during all the assessments were assigned to the Stable Uninhibited group. The other children were assigned to the Unstable Inhibited or Unstable Uninhibited group depending on their group membership during the first assessment. Structured interviews with the mother were used to determine child psychopathology when the child was 7½ years old. Results indicated that the Stable Inhibited group was mainly female, while the

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Stable Uninhibited group was mainly male. Furthermore, it was found that the Stable Inhibited group as compared to everyone else combined showed higher rates of having any anxiety disorder, of having more than two anxiety disorders, and of having phobic disorders. Furthermore, those children who were in the Stable Uninhibited group had a greater rate of oppositional disorder than all non-Stable Uninhibited others. Thus, it appears that stable behavioral inhibition traits present a stronger risk factor for the development of later psychopathology than behavioral inhibition as assessed at one point in time.

The relationship between fearful temperament and internalizing problems in general has also been examined (Oldehinkel et al., 2004; Rydell, Berlin, & Bohlin, 2003). Oldehinkel et al. (2004) studied the relationship between temperament and externalizing, as well as internalizing psychopathology. The sample used for the study consisted of preadolescents who were concurrently assessed for temperament and psychopathology. Temperament was assessed via parent report, while psychopathology was measured through parent and self-report. Findings regarding the temperament construct of fear indicated that fear was chiefly related to internalizing problems, and it was also related to the severity of expressed symptoms. Hence, fear was implicated as a risk factor for internalizing psychopathology. The authors even go so far to say that fear "seems to be more detrimental than beneficial" (p. 435). Rydell et al. (2003) also studied the relationship between several temperamental constructs and internalizing, as well as externalizing disorders. They followed children from the age of five until the age of eight. Parents, day care providers, and later teachers completed measures of psychopathology in this study. Results regarding fear indicated that fearfulness predicted internalizing problems as reported by the mother, but not the teachers, and that low fear regulation predicted internalizing psychopathology as reported by the elementary school teacher, but not the parent. The authors

discuss that these somewhat inconsistent results may be due to the low agreement between parents and teachers when rating internalizing problems. Furthermore, it was found that fear was linked to prosocial behavior. Higher fearfulness was related to greater prosocial behavior in preschool; thus, demonstrating that fearfulness also appears to serve as a protective factor.

After reviewing this literature, it becomes apparent that there is a link between the temperament concept of fear and the development of internalizing psychopathology. However, most of the discussed research only considers fear indirectly as part of the BIS or a component of behavioral inhibition. More research is needed to link early fear specifically to the development of later internalizing disorders. Furthermore, more longitudinal research is needed to link the two concepts and show that fear truly is a risk factor and not just a correlate of internalizing problems. Since there have been some contradictory findings regarding the relationship between fear and depression, it would also be of benefit to study this relationship in greater detail to assess which factors might have contributed to the divergent findings. Gender, for example, may be a variable that confounds this relationship since the discussed findings indicate that fear levels differ in males and females. Thus, it would be of interest to study the influence of this variable in more detail.

Fear and its Relationship to Externalizing Disorders

Fear as a risk factor. Fear, or more specifically fearlessness, has been studied as a risk factor for externalizing psychopathology. A longitudinal study examined the relationship between fearlessness among other factors at the age of three and the development of aggression at the age of eleven (Raine, Reynolds, Venables, Mednick, & Farrington, 1998). Raine et al. (1998) found that higher fearlessness at the age of three was related to higher scores on an

aggression scale at the age of eleven, implicating fearlessness as a risk factor for the development of later behavior problems.

Another longitudinal study identified fearlessness as a risk factor for the development of externalizing behavior problems. In this study, risk factors for the development of conduct problems were examined (Shaw, Gilliom, Ingoldsby, & Nagin, 2003). Children were followed from the time they were 1½ until the age of eight. The researchers were able to identify four different trajectories for the development of externalizing problems in the course of this longitudinal design. It was found that being fearless was one of the factors that increased the probability of following the most severe trajectories. In fact, there was a significant difference between the levels of fearlessness in the least severe group and the levels of fearlessness in the two most severe groups, with the children in the groups with the most severe/stable conduct problems exhibiting the highest levels of fearlessness (i.e., the lowest levels of fear). These findings support those by Raine et al. (1998) that fearlessness is a risk factor for the development of later externalizing psychopathology.

Another relevant study that has already been partially discussed, was conducted by Colder et al. (2002). This investigation examined the interactive effects of fear and activity level on the development of later psychopathology. Since this study was previously discussed in greater detail only the results pertaining to this section will be mentioned here. Regarding the externalizing symptoms it was found that in boys, high activity level paired with low fear predicted increasing externalizing symptoms. On the other hand, it was found that high levels of fear in girls predicted higher average levels of externalizing symptoms, which was unexpected by the authors and is contrary to the idea of fear playing a protective function in the development of externalizing behavior problems.

Fear as a protective factor. Nonetheless, fear has been shown to act as a protective factor in some instances. One study examined the relationship between behavioral inhibition and the development of later externalizing problems (Schwartz, Snidman, & Kagan, 1996). Children who had been assigned to either an inhibited or an uninhibited group when they were 21 or 31 months of age were assessed for psychopathology when they were 13 years of age. Parent report, as well as self-report was used to measure behavior problems. Findings indicated that 13-year-olds, who had been classified as inhibited at the age of 21 months, had lower externalizing behavior scores than those who had been classified as uninhibited. The latter results were consistent for self-report, as well as parental report. However, there were no significant findings for the group that had been assessed for behavioral inhibition at the age of 31 months. Schwartz et al. (1996) noted that the lack of findings for this group may have been due to incorrect classification at that time. The findings from the first group, however, provide some evidence that higher levels of fear (or lack of fearlessness) may serve as a protective factor from developing externalizing behavior problems.

The study conducted by Rydell et al. (2003) that was discussed earlier, showed that higher fearfulness was linked to prosocial behavior. This would implicate that fearfulness could serve as a protective factor in relation to the development of externalizing psychopathology. Externalizing psychopathology is often associated with the violation of the rights of others. Hence, if higher fearfulness is related to greater prosocial behavior, it would be protective when it comes to developing psychopathology that involves antisocial behavior.

In concordance with the study by Rydell et al. (2003), fearfulness has also been linked to the development of a conscience (Fowles & Kochanska, 2000). Fowles and Kochanska (2000) studied conscience development longitudinally, from the age of 32 months until four years of

age. The predictors measured at toddler age were attachment security and maternal gentle discipline. Maternal gentle discipline is a technique of parenting that does not rely on power, but rather on instilling internal comfort. The outcome variable was conscience at the age of five. Conscience was assessed in a game-playing paradigm that created opportunities for the child to cheat, and in a paradigm that involved giving the children hypothetical moral dilemmas that they had to resolve in a narrative. Of importance for this review paper, are the moderator variables used in the study, namely fearfulness and electrodermal reactivity. As discussed earlier, electrodermal reactivity has been linked to the BIS (Fowles et al., 2000). Fearfulness was measured at toddler age, while electrodermal reactivity was assessed when the children were four years old (Fowles & Kochanska, 2000). Children were divided into two groups according to their electrodermal reactivity. If they were below the median they were in the nonreactive group and if they were above they were in the reactive group. Findings of the study indicated that for nonreactive children attachment security predicted conscience development; while for the reactive children maternal gentle discipline was the most critical predictor. This is on concordance with earlier findings by Kochanska (1997) that maternal gentle discipline predicted conscience development in fearful children, while attachment security predicted conscience development in fearless children. Furthermore, the study by Fowles and Kochanska (2000) also examined the groups of children who were either both nonreactive and fearless or reactive and fearful. As expected attachment predicted conscience development for the nonreactive/fearless group; however, for the reactive/fearful group age and gender predicted conscience development, but not maternal gentle discipline as would have been expected. It was found that older age and being female was predictive of conscience development. The authors discussed that this might be due to socialization influences in that group, since compliance and empathy may be more

emphasized in the rearing of girls than in the rearing of boys. Furthermore, the authors suspected that the children are more responsive to socialization influences as they grow older than the nonreactive/fearless children. Overall these results and the Kochanska (1997) findings show that fearfulness may serve as a protective factor in the context of externalizing psychopathology, given its relationship to conscience development. Interestingly, conscience development in fearless children was not determined by parenting per se, as by the relationship to the parent, which has been considered to be a "reward-based pathway" (Fowles & Kochanska, 2000, p. 789). On the other hand, the fearful children were more responsive to the "anxiety-based pathway" (Fowles & Kochanska, 2000, p. 789). Thus, fearful children tend to benefit from gentle discipline that generates optimal levels of fear (Fowles & Kochanska, 2000).

Limitations of Previous Research

After reviewing the aforementioned studies, it becomes apparent that many of them did not study the relationship between fear in its basic form as a temperament characteristic and the development of psychopathology. Most studies examined the relationship between the BIS, a concept that involves the construct of fear, but is not synonymous with it and the development of psychopathology. Thus, more research exploring the relationship between specifically the temperament construct of fear and the development of psychopathology are needed. Furthermore, the construct of fear is not measured consistently across studies. Sometimes just the number of fears that a child has are assessed, while at other times also the intensity of the responses are taken into account. Different ways of assessing fear can lead to divergent findings in the studies. Hence, it would be of benefit to become more consistent when operationalizing and measuring fear.

In addition, more studies are needed to study the relationship between fear and psychopathology longitudinally. When considering those studies that measure fear and especially internalizing psychopathology in close proximity, it is unclear whether two truly separate constructs are being assessed or whether they might overlap. Longitudinal studies that assess fear before the psychopathology develops are preferable. Assessing fear as early as possible would help in ruling out the potential confound.

Purpose of Study

The purpose of the present study is to link fear in infancy to the development of behavior problems at toddler age to help establish that the there is not simply a concurrent relationship, but that early fear can predict later behavior problems. In addition, this research is important because there is a dearth of research linking infant temperament to later psychopathology. Furthermore, since past research has often used concepts like behavioral inhibition and the BIS that also encompass fear and linked them to psychopathology, it is not as clear what the exact relationships between just temperamental fear and psychopathology are. Thus, this study will concentrate on fear as a predictor for psychopathology. Furthermore, in the context of this study, the protective qualities of fear will also be examined. In addition, mediational analyses will be conducted to determine whether effortful control and an early precursor of effortful control, namely Orienting/Regulatory Capacity will mediate the relationship between fear and later psychopathology. This analysis is of great interest due to the link between effortful control and the development of psychopathology. Furthermore, the BIS has been linked to the development of psychopathology and the BIS encompasses aspects of fear and behavioral inhibition. Thus, links between the two concepts in the prediction of psychopathology have been established, that this study will attempt to clarify.

It is hypothesized that low levels of fear will be linked to increased externalizing psychopathology, while increased levels of fear will be linked to more internalizing symptoms. Furthermore, higher levels of fear are hypothesized to serve as a protective factor from developing externalizing psychopathology. In addition, it is hypothesized that effortful control and early Orienting/Regulatory Capacity will mediate the relationship between fear and psychopathology. Specifically, high levels of fear are expected to be associated with higher levels of effortful control and Orienting/Regulatory Capacity. Higher effortful control, as well as higher Orienting/Regulatory Capacity, are in turn is expected to be related to decreased externalizing symptoms and internalizing symptoms.

CHAPTER TWO

Methods

Participants

The sample consists of a subgroup of families whose infants have been assessed from the time they were four months until they were twelve months of age, every two months. This assessment included a comprehensive temperament assessment in the laboratory, as well as through parent report at each measurement point. Furthermore, parents also provided demographic data, data about parenting stressors, information on their anxious and depressive symptoms, and they completed a self-report measure assessing their own temperament. The follow-up occured at toddler age, between 18 and 35 months. The original sample consisted of 93 families with infants. This group of families was recruited to ensure an approximately equivalent age and gender distribution Information about the study was provided to all families who have given birth in the hospitals in the Pullman (Washington) and Moscow (Idaho) area by a child abuse prevention program. Interested parents then provided their contact information and were called by a lab assistant when the child was about 3 months of age to schedule an appointment. Furthermore, birth announcements from hospitals published in the local newspapers were used to recruit parents. No parent refused to participate in this study when originally invited to take part, however, several families (N = 15) chose not to continue after one or more data collection phases. For the follow-up, the provided contact information was used to call those families who had completed the first study and whose children are between 18 and 35 months of age. Families who agreed to participate in this study then received questionnaires in the mail. Questionnaires with attached cover letters explaining the follow-up study were also sent to families who could not be reached by phone. 50 parents could be reached by phone and all

agreed to participate in the follow-up study. 9 additional packets were sent out to participants who could not be reached via the phone. 45 families completed the follow-up study and returned the questionnaires. The infants of the participating families ranged in age from 19 to 33 months, with a mean age of 23 months. 51.1% of the infants were female, while 48.9% were male. All respondents were mothers. Regarding ethnicity 95.6% of the mothers were Caucasian, 2.2% were Asian, and one respondent did not supply this information. 95.6% of the mothers were married, while 2.2% were single and one person did not respond.

<center>*Procedures*</center>

Parents were contacted on the telephone and asked to complete the Early Childhood Behavior Questionnaire (ECBQ; Putnam, Gartstein, & Rothbart, in press) and the Child Behavior Checklist for ages 18 months to 5 years (CBCL; Achenbach & Rescorla, 2000), both paper-and-pencil parent-report instruments, responding to which takes about 30 minutes. A $10 reimbursement was provided to the parents for their time commitment.

<center>*Measures*</center>

The Infant Behavior Questionnaire-Revised (IBQ-R; Gartstein & Rothbart, 2003)

The IBQ-R is a parent report temperament questionnaire that is based on the definition of temperament proposed by Rothbart & Derryberry (1981), work with the Child Behavior Questionnaire (Rothbart, Ahadi, & Hershey, 1994), comparative studies, as well as other developmental research that had identified significant dimensions and associated behavioral tendencies. The development of this measure involved (1) formulating precise operational definitions of each dimension of temperament, and items assessing each of these dimensions; (2) performing item analysis items across the different age groups of infants (i.e., eliminating items with a large number of missing responses, and items that failed to contribute to the internal

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consistency of their respective scales). This multi-step process led to the development of 14 IBQ-R scales: Activity Level, Smiling and Laughter, Fear (social and non-social), Distress to Limitations, Duration of Orienting, Soothability, Vocal Reactivity, High and Low Intensity Pleasure, Falling Reactivity, Affiliation/ Cuddliness, Perceptual Sensitivity, Sadness, and Approach. A three factor structure has been demonstrated for these IBQ-R scales, including Surgency, Negative Affectivity, and Orienting/Regulatory Capacity. Reliability and validity of this parent-report instrument have been reported, with Cronbach's alphas ranging from .77 to .96 (Gartstein & Rothbart, 2003; Gartstein, Slobodskaya, & Kinsht, 2003). The Fear scale, as well as the Orienting/Regulatory Capacity Factor, were used in the context of this study.

The Temperament Laboratory Observation (TLO; Gonzales, Gartstein, Carranza, & Rothbart, 2003)

The TLO was designed for children between 6 and 12 months of age, and consists of 10 episodes: warm-up, play with toys, toy retraction, embrace with examiner, parent-child interaction, visual perceptual sensitivity, separation, peek-a-boo, auditory perceptual sensitivity, and presentation of masks. These laboratory tasks, based on, and similar to the LAB-TAB episodes (Goldsmith & Rothbart, 1996), were developed to elicit reactive and regulatory aspects of temperament. Scores derived from the TLO provide indices of threshold, latency, intensity, time to peak intensity, and recovery time for reactions that involve arousability of affect, motor activity, and related responses. The LAB-TAB (Goldsmith & Rothbart, 1996) that served as a model for the TLO has been widely used and consistently described as reliable and valid, with inter-rater agreement ranging from 88% to 99%. The TLO has satisfactory inter-rater reliability estimates (r's from .62 to 1.00). The episode that will be included in this study is the presentation of masks (e.g., intensity of facial expressions, escape behaviors, and bodily

reactions). Inter-rater agreement for this episode was satisfactory and ranged from .62 to .98. The Cronbach's alpha for this fear scale in the present study was .80.

Early Childhood Behavior Questionnaire (ECBQ; Putnam et al., in press)

The ECBQ has 15 scales that load onto three factors, namely Surgency/Extraversion, Negative Affectivity, and Effortful Control (Putnam et al.). Impulsivity, Activity Level, High-intensity Pleasure, Sociability, and Positive Anticipation all load on Surgency/Extraversion. Discomfort, Fear, Sadness, Frustration, Motor Activation, Perceptual Sensitivity, Shyness, and Soothability (loading negatively) are the scales that load on the Negative Affectivity factor. Finally, Inhibitory Control, Attention Shifting, Low-intensity Pleasure, Cuddliness, and Attention Focusing loaded on Effortful Control with a negative loading for Frustration. There were only small intercorrelations between the factors ranging from -.14 to .10. Inter-rater reliability between primary and secondary caregivers assessed at 18, 24, 30, and 36 months ranged from .27 to .48 for the Negative Affectivity factor, from .21 to .30 for Surgency/Extraversion, and from .25 to .44 for Effortful Control. For this study, the Effortful Control factor will be used. Longitudinal reliability for a six months period ranged from .76 to .83 for the Negative Affectivity factor, from .59 to .81 for the Surgency/Extraversion factor, and from .56 to .75 for the Effortful Control factor. Thus, there has been support for the reliability and validity of the measure.

Child Behavior Checklist for ages 18 months to 5 years (Achenbach & Rescorla, 2000)

The CBCL is a parent report measure of perceived child behavior problems. The scales on the CBCL measure internalizing, as well as externalizing symptomatology. For this study the internalizing symptom factor, as well as the externalizing symptom factor are used. Test-retest reliability over a period of eight days is .90 for the Internalizing scale and .87 for the

Externalizing scale (Achenbach & Rescorla, 2000). Thus, there is support for the test-retest reliability of the scales that will be used for this study. Furthermore, the validity of the measure has been supported. Achenbach and Rescorla (2000) report that children who were referred for mental health or special education services had significantly higher scores on all the problem scales than nonreferred children. Furthermore, they note that the problem scales show predictive and concurrent relationships to several other measures of problem behaviors.

CHAPTER THREE

Results

Missing Data

All 45 parents who participated in the follow-up study completed both questionnaires.

However, two families did not complete the IBQ-R at 12 months and only completed the

observation. Since these families also did not complete the previous IBQ-R the N was reduced to

43 for the analyses that included fear as assessed by the IBQ-R. One family also did not

complete the 12 month laboratory visit, but their data was substituted with the data from the 10

month visit after it was insured that the fear scores from the two visits were significantly

correlated ($r = .41$, $p < .01$).

Correlational Analyses

Correlational analyses were conducted to examine the relationship between the variables

that will be included in the proposed mediational model. Results of the analyses are presented in

Table 2. Contrary to predictions, fear as assessed by observation did not correlate significantly

with fear as assessed via parent report. Furthermore, fear as assessed in the laboratory did not

correlate with any of the other variables including internalizing symptoms, externalizing

symptoms, total symptoms, effortful control, or orienting/regulatory capacity, which had not

been expected.

However, fear as assessed via parent report was positively related to internalizing

psychopathology as expected. As predicted, parent reported fear was also significantly correlated

with Orienting/Regulatory Capacity. However, contrary to expectations, the relationship was

negative, such that higher levels of fear are related to a decreased Orienting/Regulatory Capacity.

The predicted relationships between parent reported fear and effortful control, and externalizing

symptoms could not be established. Hence, the hypotheses that higher fearfulness would serve as a protective factor from developing externalizing disorders could not be supported, since there was no significant relationship between parent-reported or observed fear and externalizing symptomatology.

Furthermore, it would have been expected that Orienting/Regulatory Capacity and effortful control would correlate to a significant degree since Orienting/Regulatory Capacity is assumed to be an early indicator of effortful control, which was not the case. However, the relationship did approach significance in this fairly small sample (p = .09). Furthermore, as predicted, higher effortful control was linked to decreased internalizing, as well as externalizing symptoms. Thus, effortful control appears to serve as a protective factor with respect to developing behavior problems in general.

Path Analyses

An analysis of mediational relationships between infancy fear indicators as independent variables, infancy Orienting/Regulatory Capacity, as well as toddler Effortful Control as potential mediators, and toddler behavior problems as the dependent variables was performed. Fear as assessed by the parents, via the IBQ-R, was examined as a predictor separately from the laboratory observation-based fear composite derived from the relevant TLO indicators, in order to address potential differences in their predictive relationships with later behavior problems. The proposed models are presented in Figures 1 and 2. Due to the small sample size, the two proposed mediators were first examined in separate models. The maximum likelihood parameter estimates for the eight proposed models are presented in Table 3. As can be seen from these results, none of the proposed models were adequate in explaining the data. Given that none of the models had produced significant relationships between the potential mediator variable and two

additional variables, which would be required for a mediational model (Baron & Kenny, 1986), a mediational relationship could not be established. Hence, no fit statistics were computed.

Since the simple mediational models did not appear to adequately explain the significant relationship between fear as assessed via parent-report and internalizing symptoms, an exploratory analysis was conducted to determine whether a model that integrates the two mediator variables, namely Effortful Control and Orienting/Regulatory Capacity, would present a better fit (Figure 3). This model has 2 degrees of freedom (N = 43). The Model Chi-Square, Comparative Fit Index (CFI), the Goodness-of-Fit Index (GFI), the Adjusted Goodness-of-Fit Index (AGFI), and the Root Mean Square Error of Approximation (RMSEA) were used to assess model fit. For the newly proposed model the Model Chi-Square = .40 (p = .82), indicating that the tested model should not be rejected, but rather presents with adequate fit. Furthermore, the CFI = 1.00, the GFI = .995, and the AGFI = .976, also support the notion of satisfactory model fit, because the GFI and CFI are expected to be between .90 and 1.00, and the AGFI is expected to be close to the GFI in value. In addition, the RMSEA is indicative of adequate model fit, since it equals .00 (.00 - .18), and it is assumed that it should be smaller than .05 for models with good fit.

As can be seen in Table 4, fear as assessed by the IBQ-R at 12 months of age predicts Orienting/Regulatory Capacity at 12 months. Although, Orienting/Regulatory Capacity does not significantly predict Effortful Control at toddler age in the model, the path coefficient does approach significance (p = .08). Although such statistical trends should be interpreted with caution, the path approaching significance is likely to reflect a potentially meaningful relationship in this study, given a limited amount of participants, which can be expected to decrease power. Furthermore, Effortful Control then significantly predicted internalizing

symptoms. As expected there was also a significant direct effect of fear on internalizing

symptomatology. Furthermore, results of the present analysis provided some support for a

partially mediated model. Although the direct relationship between parent-reported fear and

internalizing symptoms was still significant in the mediational model (r = .303; p < .05), the

strength of the relationship between the two variables decreased, as is indicated by the indirect

effect of reported fear on internalizing symptoms (r = .025). While this indirect effect is small, it

is probable that this is due to the small sample size, and partial mediation is likely present. If the

effect were spurious, it would be unlikely that the mediators were related to both fear and

internalizing symptoms, as well as to each other. Furthermore, when the fit of the mediational

model was compared to the fit of the model assuming that no mediation is present, the difference

in the chi-square indicators of fit was significant ($\Delta T = 11.93$, p < .05), indicating that the

mediational model presents a significantly better fit.

CHAPTER FOUR

Discussion

Summary of Findings

It was hypothesized that low levels of fear would be linked to increased externalizing psychopathology, while increased levels of fear would be linked to more internalizing symptoms. Only partial support could be found for these hypotheses. No link could be established between fear and externalizing psychopathology. However, support was found for the predicted relationship between parent-reported infant fear and internalizing symptoms at toddler age. Fear as assessed in the laboratory, on the other hand, was not related to internalizing symptoms. Additional relationships that emerged in this study include a negative relationship between reported infant fear and Orienting/Regulatory Capacity, a trend towards a positive relationship between Orienting/Regulatory Capacity and Effortful Control, and a negative relationship between Effortful Control and internalizing symptomatology.

The fact that no relationship between fear and externalizing symptoms could be established may have been due to potential interaction effects with other variables such as gender or activity level, that have been suggested in past research (e.g., Colder et al., 2002), but could not be explored in the present study due to a limited number of participants. Colder et al. (2002) found, for example, that low fear only predicted externalizing symptoms for children who were male and also had a high activity level. For girls, however, fear was significantly positively related to externalizing disorders at the age of 6 years, but not 4 or 8 years. No main effects were found between fear and externalizing for boys. Hence, the present nonsignificant findings may reflect the presence of interaction effects, beyond the scope of the present investigation.

It was also not expected that observed fear would not correlate with any of the other examined variables. This may be due to the fear inducing environment in the laboratory, as well as the fact that as discussed earlier fear in general and stranger fear in particular peaks at about the age of 12 months. The lab environment is an unfamiliar artificial environment that confronts the infant with a variety of novel stimuli, including an unfamiliar experimenter, novel tasks, and unfamiliar toys. All these novel stimuli are fear inducing. Hence, infant's reactions in the laboratory may not have been representative of their fear reactions in familiar environments with familiar caregivers. Furthermore, since fearfulness peaks around the age of 12 months, it is possible that the limitations of the laboratory evaluation, having to do with accentuating fearful reactivity, were even further exaggerated, leading to a failure to capture the variability of fear responses that the parents are able to observe at home. Thus, it is possible that the infants' reactions in the laboratory may not have been representative of their fear reactions in familiar environments with their usual caregivers, which may have led to the non-significant associations with the laboratory-based fear score observed in this study.

It was also hypothesized that effortful control and early Orienting/Regulatory Capacity would mediate the relationship between fear and psychopathology. Specifically, high levels of fear were expected to be associated with higher levels of effortful control and Orienting/Regulatory Capacity. Higher effortful control, as well as higher Orienting/Regulatory Capacity were in turn is expected to be related to decreased externalizing symptoms and internalizing symptoms. The predicted relationships could not be established in the mediational models incorporating fear as assessed in the laboratory or the models predicting externalizing disorders. Furthermore, the proposed models were not able to explain the data adequately or establish a mediational relationship to explain the significant association between parent-reported

fear and internalizing symptoms. Thus, a more complex model with two mediators was considered next, incorporating both Effortful Control and Orienting/Regulatory Capacity as potential mediators of the relationship between parent-reported fear and internalizing symptoms. Although, a statistically significant relationship between Effortful Control and Orienting/Regulatory Capacity could not be established, the path coefficient associated with these variables approaches significance. In the context of this model it appears reasonable to interpret this trend since the sample size for the current study was limited, likely contributing to lower power and the ultimate lack of statistical significance. Thus, the overall model suggests that there is a positive relationship between fear and internalizing symptoms, with higher levels of fear leading to more pronounced internalizing symptoms. Infant fear was linked with Orienting/Regulatory Capacity, with higher infant fear being linked to lower infant Orienting/Regulatory Capacity, which in turn appears to be positively related to toddler Effortful Control. Finally, toddler Effortful Control was negatively associated with concurrent internalizing symptomatology. The data supported a probable partial mediational relationship, meaning that part, but not all, of the effect of fear on internalizing symptoms is explained by Orienting/Regulatory Capacity and Effortful Control. Fear was still significantly related to internalizing symptomatology even after accounting for the effects of Orienting/Regulatory Capacity and Effortful Control. The positive relationship between fear and internalizing symptomatology replicates findings from past research that has repeatedly linked fear to symptoms of anxiety, as well as depression (e.g., Biederman et al., 2001; Biederman et al., 1993; Biederman et al., 1990; Hayward et al., 1998; Oldehinkel et al., 2004; Pine et al., 2001; Rydell et al., 2003). However, only some of those studies have explored the relationship between specifically fear and internalizing symptoms longitudinally. Pine et al. (2001), for example,

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linked fear during adolescence to the development of depressive symptoms in adulthood. Furthermore, Colder et al. (2002) studied the link between infant fear and the development of internalizing symptoms at ages 4, 6, and 8 years. However, they were only able to demonstrate a relationship between fear and internalizing symptomatology for four year old girls. Hence, this relationship was fairly limited and the interaction of fear and activity level was more predictive than fear alone. Kagan et al. (1999) have also been able to link fearfulness at age 21 months to the development of anxiety symptoms at age 7 years. Finally, Rydell et al. (2003) have found a longitudinal relationship between fear and the development of internalizing problems. The children were followed between the age of 5 and 8 years. Hence, this finding lends support to the notion that fear is truly a risk factor for the development of internalizing problems and not just a correlate. Furthermore, this study is one of the few studies that link infant fear to the development of later internalizing psychopathology. Colder et al. (2002) have already studied the link between infant fear and later internalizing symptoms. However, their follow-up was conducted when the children were at least 4 years of age, while this study followed-up on children that were only between 18 and 35 months of age. Thus, it may have been easier to find a significant relationship between infant fear and later internalizing symptoms since there was a shorter time span between the two assessments. Hence, this study indicates that it is important to continue studying the relationship between infant fear and internalizing problems over time since Colder et al.'s (2002) study indicates that just infant fear is not significant predictor of internalizing symptoms at later ages.

According to the hypotheses, higher levels of fear were expected to be related to higher levels of Orienting/Regulatory Capacity. Results, in contrast, indicated that higher levels of fear were related to lower Orienting/Regulatory Capacity. Thus, higher levels of fear contribute to the

risk for the development of internalizing problems by leading to lower regulatory capacity in infancy, which in turn could be expected to be associated with decreased effortful control capabilities in the toddler period. Increased effortful control, in turn, was demonstrated as a protective factor in relation to the developing internalizing symptomatology. The present findings are in part contradictory to some previous research demonstrating that increased fear was related to increased effortful control; for example, research by Kochanska et al. (1994) who reported that increased fearfulness in girls was related to greater conscience development; effortful control has been shown to be positively related to conscience development (Kochanska et al., 1994; Kochanska & Knaack, 2003; Kochanska et al., 1997). However, the relationship between fearfulness and conscience development could not be established in boys (Kochanska et al., 1994), leading to some "nuances" in the prior results. Infant fear and infant regulatory capacity may be negatively related because infants who are more fearful are more distressed by new situations, thus, having more difficulty regulating their responses. Higher effortful control was hypothesized to be related to decreased internalizing symptoms and the present findings support the hypothesis. Thus, the present findings replicate findings by Eisenberg (2004) that there is a negative relationship between effortful control and internalizing symptoms, which is mediated by resiliency. Thus, it appears that higher effortful control is generally a protective factor from developing psychopathology.

Implications for Future Research and Limitations of Current Study

Important factors that should be addressed in future research include the study of interaction effects. Taking into account effects of other variables that could not be examined in the context of the present study, especially gender is very important because of the previously

discussed sex differences in development of fear. Examining moderating effects may further clarify the applicability of the present results.

Another limitation of this study was that the data for internalizing and externalizing symptoms was not normally distributed. Analyses indicated that the data for externalizing symptoms was significantly skewed, and the data for internalizing symptoms was significantly skewed and leptokurtic. This could have distorted the present finding to the extent that the statistical analyses conducted in this study included an underlying assumption of a normal distribution. However, the fact that predicted relationships emerged despite this violation of a statistical assumption also speaks for the strength of the observed relationships.

Furthermore, future research should seek to replicate the results using larger sample sizes to verify the findings. It is important that the model be replicated because it was exploratory in nature. Although it is possible that a number of the findings were spurious, the later is unlikely due to the typical impact of the smaller sample size, that is, because increased effect sizes are needed to attain significant findings with a smaller sample.

Using a structural equation modeling technique with a sample of 45 participants may also be criticized. However, as was mentioned before, with smaller sample sizes one runs the risk of getting nonsignificant results with this technique even though there are significant effects that could not be detected due to a lack of power. Hence, having a small sample size only strengthens the results that have been found. In addition, this study was not able to link laboratory observed fear to parent-reported internalizing or externalizing symptoms. Hence, future studies should also attempt to measure internalizing and externalizing symptoms as observed in the laboratory to determine whether those could be predicted by early observed fear. Should observed fear not be able to predict observed behavior problems, it may be necessary to reevaluate the laboratory

assessment of fear and determine whether any changes need to be made to the code or laboratory assessment of fear. However, the presentation of masks, which is the episode to assess fear that has been used for this study has been used in other widely used laboratory temperament assessments, such as the LAB-TAB (Goldsmith & Rothbart, 1996). Thus, it is unlikely that the fear episode is problematic.

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APPENDIX

Table 1. Descriptive Statistics for Variables Included in Path Model.

Variable	Mean	SD	Range
IBQ-R Fear	2.96	.81	1.00 – 4.69
Labfear	-.13	3.04	-4.61 – 5.41
Orienting/Regulatory Capacity	17.25	2.01	11.96 – 20.71
Effortful Control	19.51	2.95	11.72 – 25.15
Internalizing Symptoms	6.71	4.59	0 - 21
Externalizing Symptoms	12.33	7.64	0 - 34

Table 2. Correlations.

Variable	1	2	3	4	5	6
1. Labfear	---	.090	.081	-.159	-.037	.034
2. IBQ Fear		---	.003	-.312*	.304*	-.068
3. Effort. C.			---	.263	-.307*	-.635**
4. Or./Reg. C.				---	-.199	-.191
5. Int. Sympt.					---	.395**
6. Ext. Sympt.						---

* $p < .05$; ** $p < .01$. Effort. C. is Effortful Control; Or./Reg. C. is Orienting/Regulatory Capacity; Int. Sympt. is

Internalizing symptoms; Ext. Sympt. is Externalizing symptoms.

Table 3. Maximum Likelihood Parameter Estimates for Proposed Models.

Parameter	Unstandardized	SE	Standardized
Model 1	Direct Effects		
IBQ-R Fear → Or./Reg. C.	-.776*	.365	-.311
Or./Reg. C. → Ext. Sympt.	-.909	.596	-.240
IBQ-R Fear → Ext. Sympt.	1.360	1.488	-.144
Model 2			
IBQ-R Fear → Or./Reg. C.	-.774*	.366	-.310
Or./Reg. C. → Int. Sympt.	-.260	.351	-.114
IBQ-R Fear → Int. Sympt.	1.498	.874	.263
Model 3			
Labfear → Or./Reg. C.	-.103	.101	-.156
Or./Reg. C. → Ext. Sympt.	-.733	.580	-.193
Labfear → Ext. Sympt.	.010	.377	.004
Model 4			
Labfear → Or./Reg. C.	-.103	.101	-.156
Or./Reg. C. → Int. Sympt.	-.469	.348	-.205
Labfear → Int. Sympt.	-.105	.226	-.069
Model 5			
IBQ-R Fear → Effort. C.	.013	.562	.004
Effort. C. → Ext. Sympt.	-1.647**	.301	-.635
IBQ-R Fear → Ext. Sympt.	-.669	1.120	-.071
Model 6			
IBQ-R Fear → Effort. C.	.010	.562	.003
Effort. C. → Int. Sympt.	-.480*	.213	-.308
IBQ-R Fear → Int. Sympt.	1.705*	.790	.299
Model 7			
Labfear → Effort. C.	.079	.146	.081
Effort. C. → Ext. Sympt.	-1.666**	.301	-.642
Labfear → Ext. Sympt.	.217	.292	.086
Model 8			
Labfear → Effort. C.	.079	.146	.081
Effort. C. → Int. Sympt.	-.477*	.224	-.306
Labfear → Int. Sympt.	-.019	.217	-.012

*$p < .05$; **$p < 01$. Effort. C. is Effortful Control; Or./Reg. C. is Orienting/Regulatory Capacity; Int. Sympt. is Internalizing symptoms; Ext. Sympt. is Externalizing symptoms.

Table 4. Maximum Likelihood Parameter Estimates for the Structural Equation Model Including Both Effortful Control and Orienting/Regulatory Capacity as Mediators

Parameter	Unstandardized	SE	Standardized
	Direct Effects		
IBQ-R Fear → Or./Reg. C.	-.777*	.365	-.312
Or./Reg. C. → Effort. C.	.394	.223	.263
IBQ-R Fear → Int. Sympt.	1.772*	.807	.303
Effort. C. → Int. Sympt.	-.479*	.217	-.305
	Indirect Effect		
IBQ-R Fear → Or./Reg. C.	.000		.000
Or./Reg. C. → Effort. C.	.000		.000
IBQ-R Fear → Int. Sympt.	.147		.025
Effort. C. → Int. Sympt.	.000		.000
	Variances		
IBQ-R Fear	.638**	.139	
Or./Reg. C. Error	3.574**	.780	
Effort. C. Error	8.242**	1.798	
Int. Sympt. Error	17.473**	3.813	

*$p < .05$; **$p < 01$. Effort. C. is Effortful Control; Or./Reg. C. is Orienting/Regulatory Capacity;

Int. Sympt. is Internalizing symptoms; Ext. Sympt. is Externalizing symptoms.

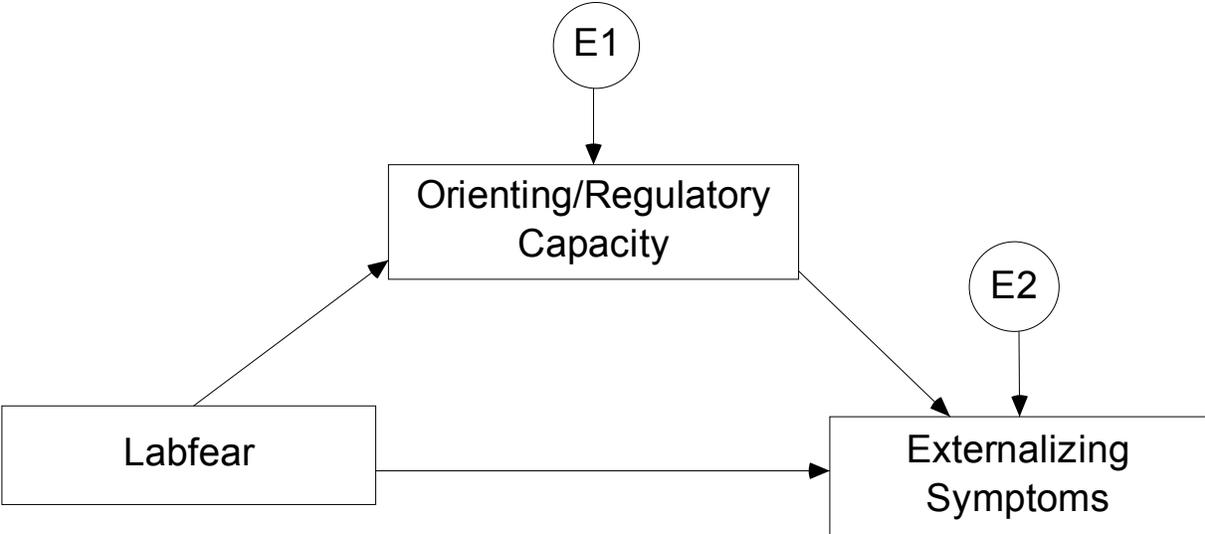Figure 1. Predicted Path Models Using Orienting/Regulatory Capacity as a Mediator.
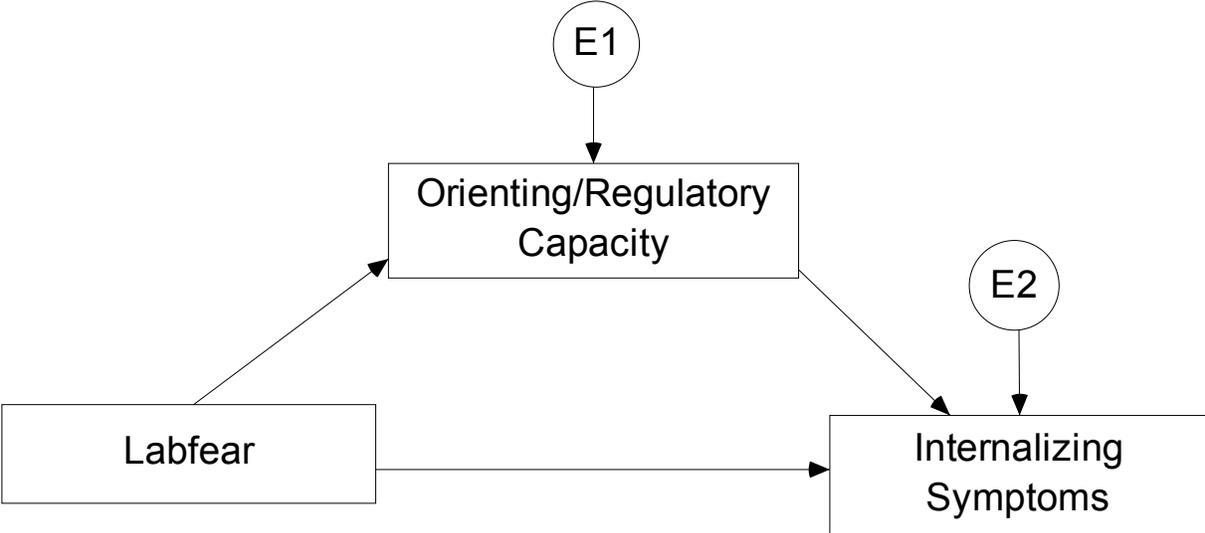
Model 1.
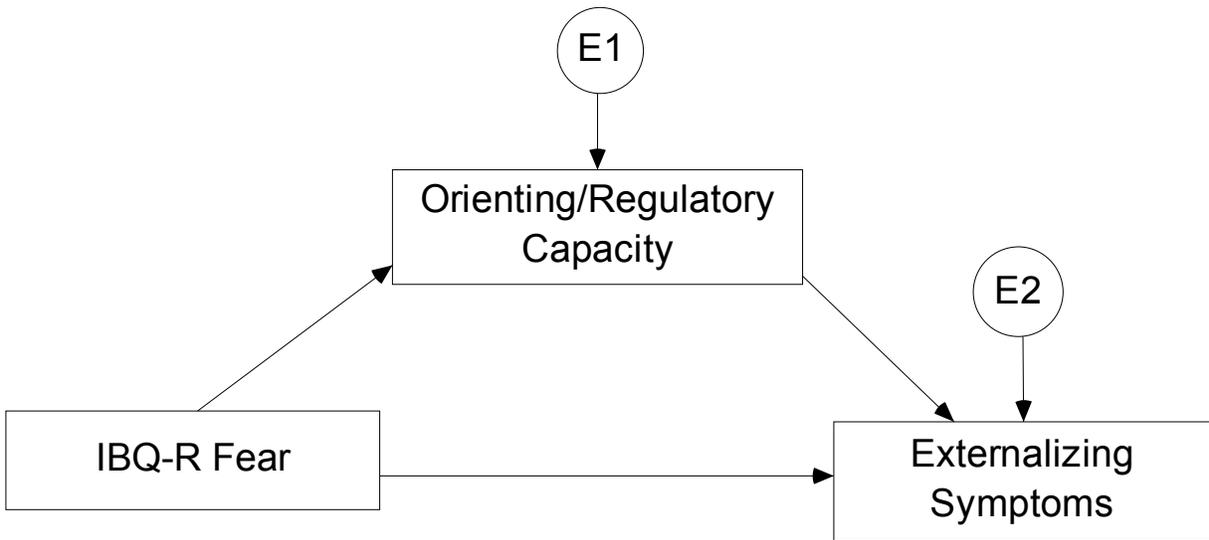
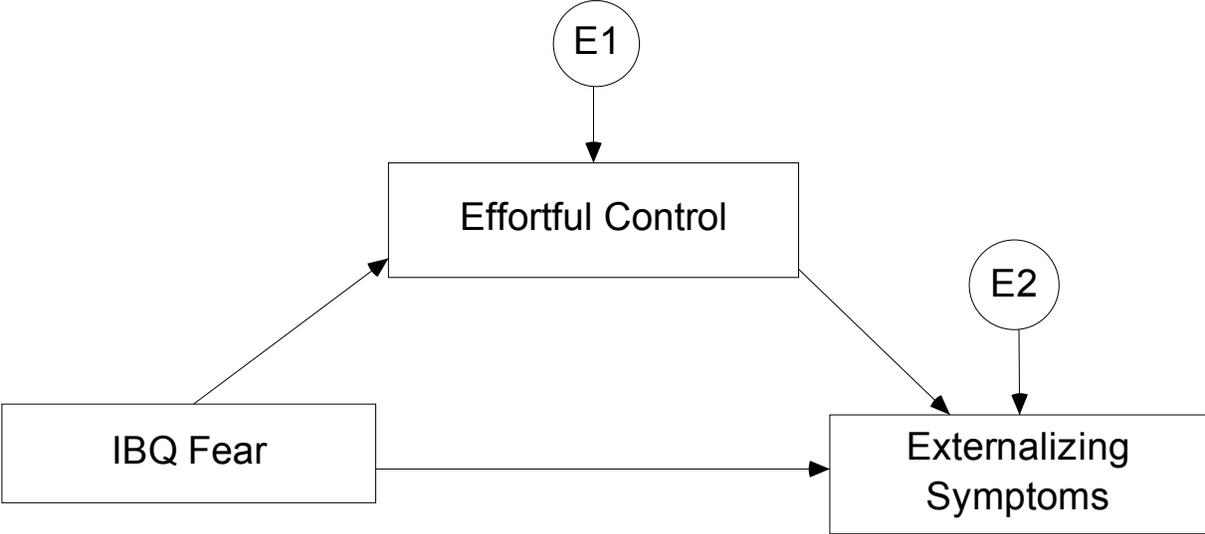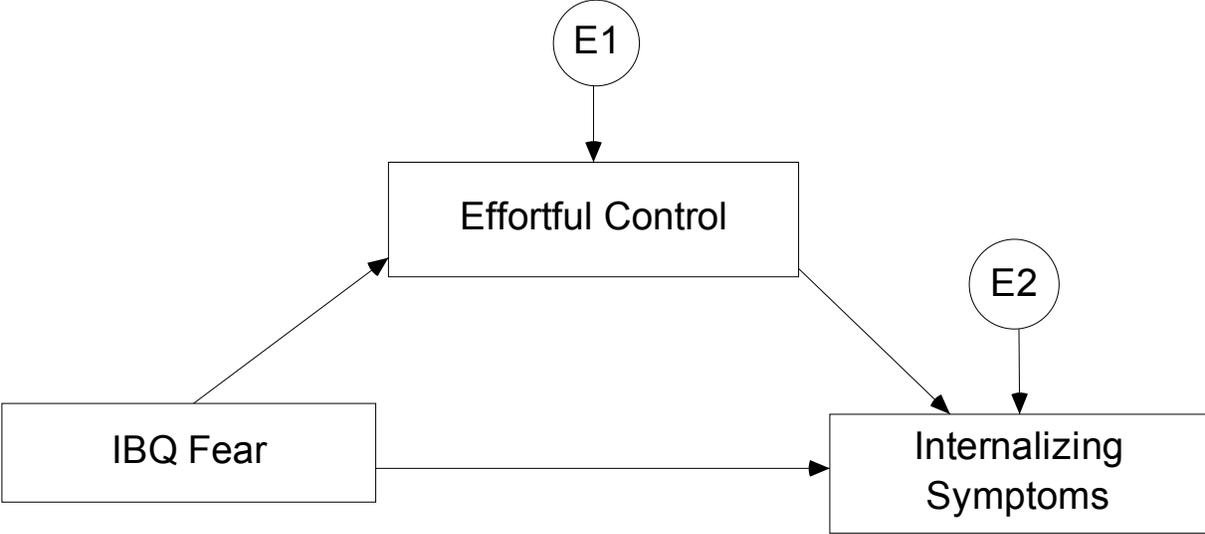Model 2.
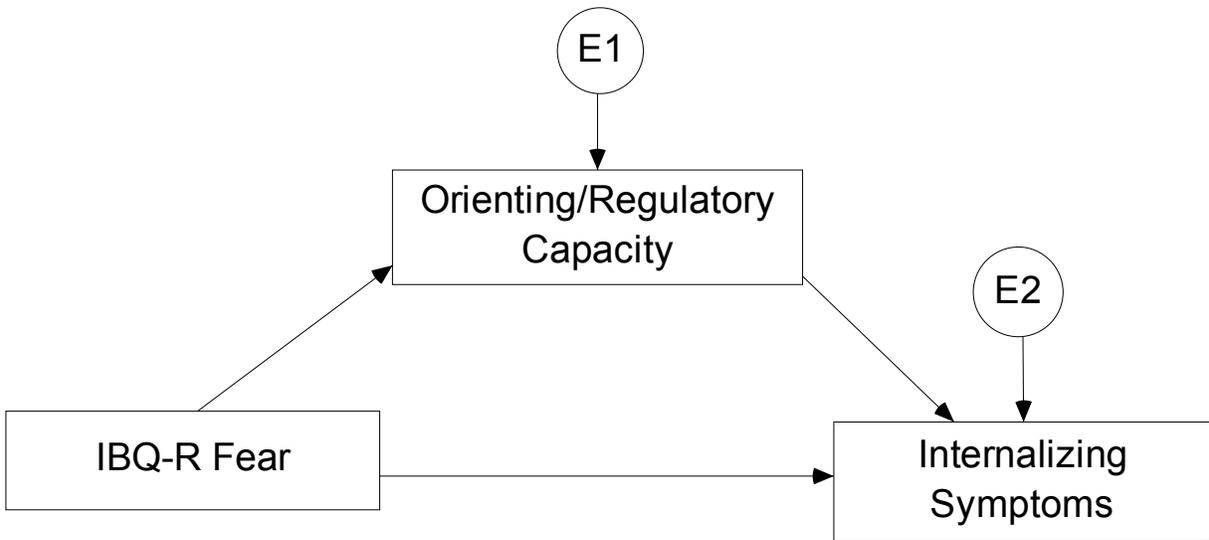
Model 3.

Model 4.

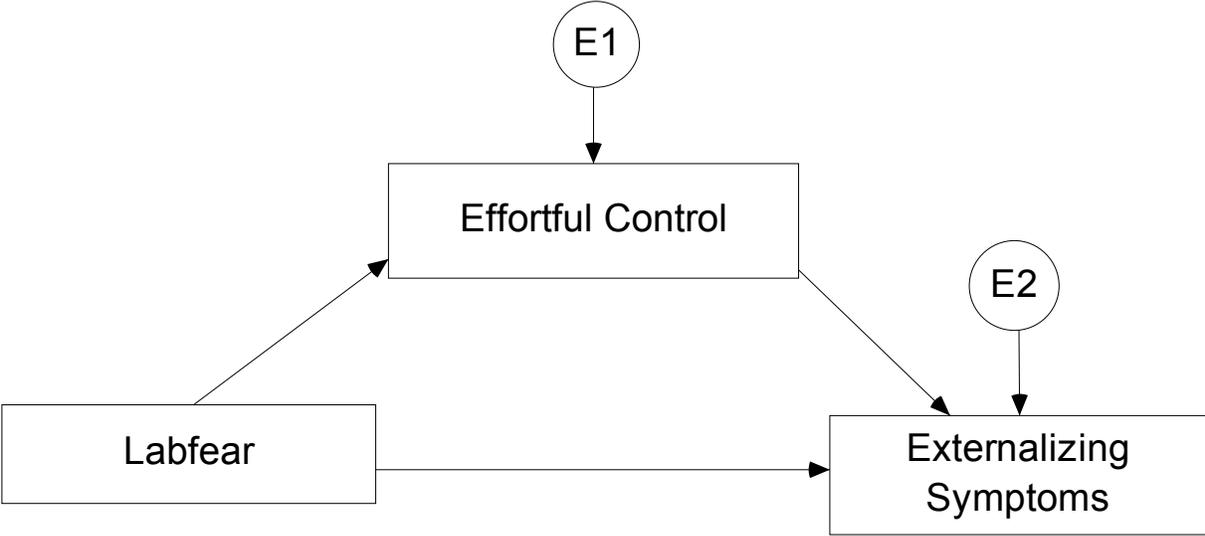Figure 2. Predicted Path Models Using Effortful Control as a Mediator.

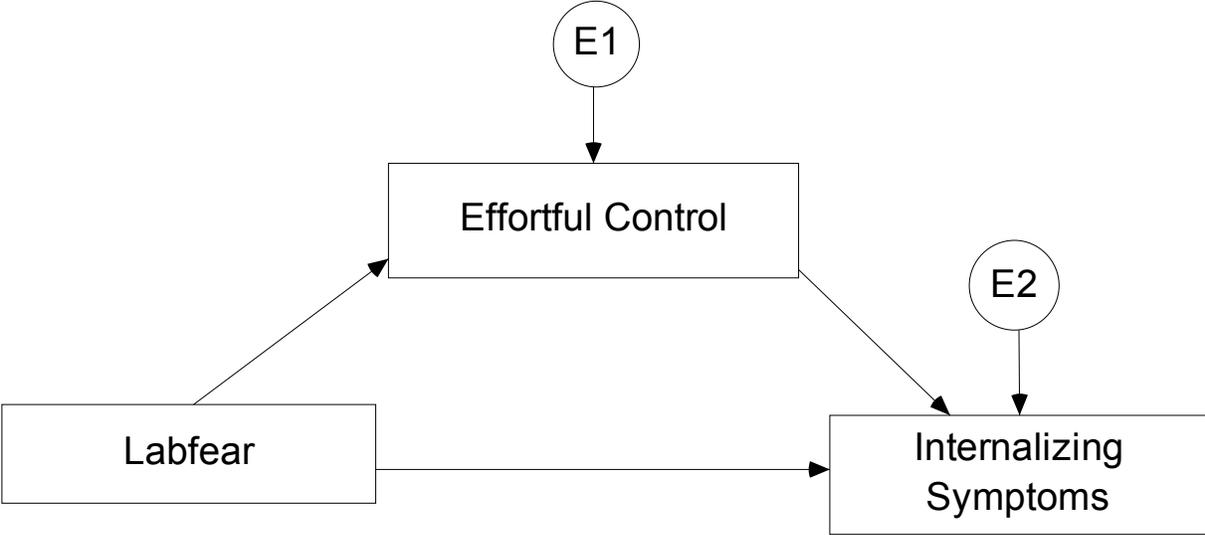Model 5.

Model 6.

Model 7.

Model 8.

Figure 3. Exploratory Path Model Using Orienting/Regulatory Capacity and Effortful Control as

Mediators