MODERATING FACTORS FOR FINDINGS OF SEX DIFFERENCES IN EARLY FEAR

By

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The literature regarding sex differences in early fear is mixed in its results, indicating trends in which parent-report data most often show females as more fearful than males, but laboratory observation-based data generally demonstrate no significant sex differences. The present study examined the possibility of a moderating effect of measure type (i.e., parent-report versus laboratory observation) on the relationship between child sex and early fearfulness. A sample of 112 infants (58 male, 54 female) was assessed for fear levels via parent-report and laboratory observation of temperament at 12 months of age, and 85 of these infants (46 male, 39 female) were followed-up as toddlers, utilizing parent-reports of temperament and behavior problems, which included scales addressing fear and internalizing problems, respectively. Correlations of 12-month parent-report and laboratory observation-based fear scores were computed separately for males and females, which demonstrated significant correlations for female, but not male, infants. The magnitudes of these correlations were compared, and did not yield a significant difference. Next, two t-tests were used to examine possible sex differences in fear levels at 12-months based upon parent-report and laboratory-observation. No significant differences were found for either measure. In addition, a one-tailed t-test was conducted to test the hypothesis that parents would report females as significantly more fearful than males at toddler age. This hypothesis was confirmed. Finally, a hierarchical multiple regression was
utilized to determine the unique contributions of child sex, parent-reported 12-month fear, laboratory-observed 12-month fear, and the interactions of child sex and each of the fear measures at 12 months, to the prediction of internalizing problems at toddler age, controlling for concurrent fear. Results indicated that the control variable, toddler-age fear, accounted for a significant portion of the variance, but that none of the other predictors was significant.
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Dedication

I would like to dedicate this dissertation to my parents, Jack and Sharon Self, who have been incredibly supportive of my academic and other endeavors. I also wish to dedicate this project to my husband, Charles Dickey, for his love, support, and encouragement throughout my graduate training.
CHAPTER ONE

Introduction

To date, the literature on sex differences in the temperament dimension of fear are inconsistent, with some studies demonstrating greater fear in females than males (e.g., Nagy et al., 2001), some studies demonstrating greater fear in males than females (e.g., Zupančič & Kavčič, 2005), and still others demonstrating no sex differences in fear (e.g., de Rosnay, Cooper, Tsigaras, & Murray, 2006). In Maccoby & Jacklin’s (1974) review of the literature, The Psychology of Sex Differences, the authors examined previous research regarding sex differences in several domains, one of which was fearfulness. Based on their research, they concluded that there was not enough evidence to determine whether or not a real sex difference in fearfulness existed. The results of a more recent meta-analysis of sex differences in various domains of temperament found a statistically significant, but arguably clinically insignificant, mean effect size \( d = -0.12 \), for sex differences in fear, favoring females as more fearful (Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006). A review of the literature suggests that these results are indicative of widespread uncertainty in the area of temperament research as to whether early sex differences in the temperament domain of fear exist, and if so, to what extent they are present.

Studies of temperament vary in methodology, ranging from laboratory observation to mother-, father-, teacher-, and sometimes self-reports of behavior related to temperament characteristics. Several authors have argued that methodology may play an important role in the differing outcomes of studies related to temperament, due to informant effects (e.g., Maccoby & Jacklin, 1974; Else-Quest et al., 2006; Zupančič & Kavčič, 2005). In fact, concluding their review on sex differences in fear, Maccoby & Jacklin (1974) indicated that they did not generally find significant sex differences in fear based on previously conducted studies that relied on
laboratory observation, but that they did find significant sex differences in studies that relied on teacher- and self-reports of fear, which indicated that girls were more fearful. They asserted that it was difficult to determine if these reported fear-related behaviors were indicative of actual sex differences or of informant effects; for example, female children being more willing to self-report fear than male children (p. 352).

Given the currently conflicting data in the literature with regard to sex differences within the temperament dimension of fear, the present paper provides a review of the literature regarding sex differences in fear from infancy through early childhood (generally including studies of children ranging in age from 0 to 5 years), and presents a study designed to examine sex differences in fear in a relatively large sample of infants and toddlers, and to determine if sex differences in fear are likely to be moderated by the type of method utilized to measure fear in infancy.

Temperament

The empirical study of temperament as it is currently conceptualized began to develop in the Twentieth Century. Early ideas leading to the modern concept of temperament were largely generated by researchers whose studies were initially intended to examine normal child development. Many of these studies, which took place in the 1920s and 1930s (e.g., Shirley, 1933), identified individual differences in infants that became apparent at ages younger than were thought to be reasonably attributable to the effects of environment or experience (Rothbart & Bates, 1998).

Despite these early observations, the study of personality development continued to rely almost exclusively on environmental, or experiential, explanations for individual differences for many more years, largely due to the strong influence of Behaviorism. Decades later, Thomas,
Chess, Birch, Hertzig, & Korn (1963) conducted the New York Longitudinal Study (NYLS), which sought to examine inherent individual differences in infancy. The NYLS identified individual differences in the characteristics of a large sample of infants, and followed them to monitor the effects of those characteristics on personality development. Through the analysis of parent-reports of behavioral reactions to various situations and stimuli during the first two years of life, the researchers concluded that humans have “individual pattern[s] of primary reactivity, identifiable in early infancy and persistent through later periods of life,” (p. 84). They also emphasized the importance of the interactions between the identified innate characteristics and environmental factors for predicting personality outcomes. Thomas and colleagues eventually employed the term “temperament” to describe these characteristics present in infancy (Rothbart & Bates, 1998).

Thomas, Chess, & Birch (1968) defined temperament as the “characteristic tempo, rhythmicity, adaptability, energy expenditure, mood, and focus of a child, independently of the content of any specific behavior,” (p. 4.). Since this conceptualization of temperament, various definitions have emerged. In recent years, a definition provided by Rothbart & Bates (1998) is commonly used, which describes temperament as “constitutionally based individual differences in emotional, motor, and attentional reactivity and self-regulation,” (p. 109). The term “constitutional” refers to the “biological bases of temperament, influenced by genetic inheritance, maturation, and experience,” (p. 109).

Like the definition of temperament, the conceptualization of the dimensions that it includes has evolved over the years. Based on the results of the NYLS, Thomas, Chess, Birch, Hertzig, & Korn (1963) identified nine categories of “behavioral functioning” of infants (which was not yet called temperament), including Activity Level, Rhythmicity, Approach/Withdrawal,
Adaptability, Intensity of Reaction, Threshold of Responsiveness, Quality of Mood, Distractibility, and Attention Span/Persistence (pp. 40-42). However, since that time, many researchers have argued that some of these dimensions measure very similar constructs. Therefore, attempts have been made in recent years to conceptualize temperament by more reliable and discriminately valid dimensions (Rothbart & Bates, 1998). In her review of temperament research, Rothbart (1989) conceptualized the structure of temperament as a progressive occurrence, with the emergence of new temperament dimensions at each stage in development. She described newborn infants as displaying the temperament dimensions of Distress/Soothability, Activity, Attention, and Approach/Withdrawal, 2- to 3-month-old infants additionally exhibiting the dimensions of Smiling/Laughter, Vocalization, Stimulus Approach/Avoidance, and Frustration, and 6-month-old infants beginning to demonstrate Inhibition of Approach, Effortful Control, and Fear (p. 196). Finally, she suggested that Effortful Control continues to develop later into life (p. 196).

Although there is not unanimous agreement among researchers regarding its definition or structure, temperament is generally conceptualized as a set of inherent and biological characteristics that interact with environmental factors to impact development and form the basis of personality. Related to its assumed biological basis, temperament is also thought to be largely heritable (Rothbart & Bates, 1998). In a study of temperament-related risk factors, Goldsmith, Lemery, & Essex (2004) reported concordance rates for temperament factors of monozygotic twins to be more than twice that of dizygotic twins, providing evidence of a strong genetic contribution to temperament. Despite the notion that temperament is primarily inherited and biologically-based, there exists a large consensus that temperament characteristics interact with the environment to influence personality and behavioral outcomes (e.g., Gartstein & Rothbart,
Temperamental Fear

The temperament dimension of fear is thought to be closely tied to behavioral inhibition (Rothbart & Bates, 1998). Behavioral activation and behavioral inhibition are described by Gray’s (1975) model, which proposes that they result from two parallel systems, the Behavioral Activation System (BAS) and the Behavioral Inhibition System (BIS), respectively. Based on the model, these systems develop at different strengths within the individual. Signals indicating potential rewards are thought to activate the BAS, and signals indicating potential punishments are thought to activate the BIS. According to the model, when the systems are in conflict, activated or inhibited approach outcomes depend on individual differences in the strength of one system relative to the other. The development of a relatively strong BAS is thought to be related to more approach behaviors in infants and children and to extraversion in adults, whereas a relatively strong BIS is thought to be related to early fear and avoidance of novel stimuli in infants and children and to introversion in adults (Rothbart & Bates, 1998). Behavioral inhibition is generally thought to develop in the second half of the first year of life and its strength is thought to be indicative of levels of temperament-related fear (Rothbart & Bates, 1998). Due to this connection between the BIS and fearfulness, the terms fear, inhibition, and withdrawal, in response to novelty, are often used relatively interchangeably within the literature.

Early fear, or behavioral inhibition, is a particularly interesting construct due to its apparent potential to predict later internalizing problems, such as anxiety disorders (Rothbart & Bates, 1998; Kagan & Snidman, 1999; Goldsmith & Lemery, 2000). In support of this idea, Biederman and colleagues (1990) assessed children who had been rated as either “inhibited” or
“not inhibited” toward novelty at 21 months of age for diagnosable anxiety disorders when they were between the ages of 4 and 7 years old. Results indicated that the participants previously identified as “inhibited” at 21 months of age were more likely than those identified as “not inhibited” to be diagnosed with more than one anxiety disorder in childhood. Similarly, Schwartz, Snidman, and Kagan (1999) found that children identified within the second year of life as inhibited in response to novelty were significantly more likely to exhibit social anxiety at age 13 years than those who were previously identified as uninhibited toward novelty.

Kagan, Snidman, Zentner, and Peterson (1999) conducted a study which identified this link even earlier, demonstrating that infants who were identified as “high reactive” at 4 months of age were more likely than those identified as “low reactive” to exhibit symptoms of anxiety at 7 years of age. Given this connection between fear, or inhibition, toward novelty and later internalizing problems, such as anxiety, the study of the temperament construct of fear may be particularly useful for better understanding the risk factors related to internalizing problems.

*Early Sex Differences in Fear*

As outlined previously, the present review of the literature is aimed at organizing and summarizing previous studies of sex differences in the fear levels of infants and young children ranging from 0 to about 5 years of age, and determining if there is a likely moderating effect of methodology on the research findings. Providing a good starting point, Else-Quest and colleagues (2006) conducted a meta-analysis of sex differences in temperament for infants and children, ages 3 months to 13 years, which reviewed studies utilizing various types of informant-reports (mothers, fathers, and/or teachers), in addition to observation-based methodology. Based on these data, they found a very small, although statistically significant, mean effect size of sex for fearfulness ($d = -0.12$), with females demonstrating greater levels of fear than males.
However, it is important to note that, although the reported mean effect size is statistically significant, it does not meet Cohen’s (1988) widely accepted criteria, even for a small effect size ($d = .20$). In addition, Else-Quest and colleagues did not conduct an analysis to examine possible moderators of this effect, so it is unclear if the type of methodology, the type of informant, and/or the age of the child may have moderated this effect. The results of this meta-analysis highlight the continued lack of understanding about sex differences in early fear in the literature, indicating that reports are mixed and that meaningful differences, if they exist, may be washed out or overly-emphasized by the types of methodology used. The following sections will look at the findings of several studies of early fear with regard to sex differences, and will be separated into groups of parent- and other-report data, observation-based data, and both parent-report and observation-based data.

**Parent- and Other-Report-Based Research**

The present review of the literature including parent- and other-reports of early levels of fear demonstrates mixed findings, although studies indicating greater levels of fear in females are predominant over those indicating other results. One such study, conducted by Richman, Stevenson, & Graham (1975) in London, gathered parent-report data on the behavior of 705, 3-year-old children. Fear was assessed via the Behaviour Screening Questionnaire (BSQ), which is a semi-structured interview that is designed to screen for several areas of problem behavior, including measures of worry and fear. Based on parent responses to this interview (primarily mothers), female children were found to demonstrate significantly more fear than male children, although no significant differences were found for worrying behaviors.

Earls (1980) attempted to replicate the findings of Richman, Stevenson, and Graham (1975) with an American sample. At least one parent, but typically both parents, of each of 100,
3-year-old children were interviewed using the BSQ to assess for areas of problem behaviors, again including worries and fears. The sex difference found for fear in the previous study was replicated in this study, indicating that parents reported female children to be significantly more fearful than male children. Interestingly, this was the only significant sex difference found in problem behaviors for the American sample, whereas the previous study also found sex differences in activity and soiling (both higher for males).

Carey and McDevitt (1978) developed a revision of the Infant Temperament Questionnaire (ITQ; Carey, 1970), and standardized their revised form on American infants, ages 4 to 8 months. The Revised Infant Temperament Questionnaire (R-ITQ) includes 95 items regarding the infant’s behavior in specific contexts, and is used to identify nine temperament categories, including the category of approach, which measures the mother’s report of the infant’s willingness to approach new items or situations, as opposed to withdrawing from them. Based upon the authors’ standardization sample of 203 infants and their mothers, results demonstrated a significant sex difference, with female infants being reported as less approaching of novel stimuli than male infants, indicating a stronger reported tendency for female infants to demonstrate greater withdrawing behavior, which can be seen as a precursor to, or indicator of, fear.

Hsu, Soong, Stigler, Hong, and Liang (1981) conducted a study using Carey and McDevitt’s (1978) R-ITQ with a sample of 349 Chinese infants, ages 4 to 8 months, and their mothers. Overall, the means for approach in the Chinese sample indicated significantly less approach reported for Chinese infants, as compared to the American infant sample used in Carey and McDevitt’s standardization study. However, within the Chinese sample, their findings
demonstrated a similar significant sex difference for approach, in which male infants were reported to demonstrate greater approach to novel stimuli than were female infants.

Maziade, Boudreault, Thivierge, Capéraà, and Côté (1984) sought to examine the effects of socio-economic status and gender on the constructs measured by Carey and McDevitt’s (1978) R-ITQ in a sample of 772 infants of French-speaking parents in Quebec. All infants were assessed via the R-ITQ at 4 months, and 358 of the original infants were re-assessed using the same measure at 8 months. Data related to approach to novel stimuli demonstrated statistically significant sex differences for both age groups, with males showing more approach than females.

In a study based in Hungary, Nagy and colleagues (2001) collected maternal questionnaire data from 957 mothers of 1- to 20-week-old infants, 708 of whom responded to questions related to the onset of infant fear expressions. Results based on maternal report indicated a significant effect of sex on age of onset for fear expressions, with the average age of first fear expression for females being about 6 days prior to the average age of first fear expression for males.

Gartstein & Rothbart (2003) developed a revision of the Infant Behavior Questionnaire (IBQ; Rothbart, 1981), a parent-report measure of infant temperament, and then tested the revised form via data collected from parents of 360 infants, ages 3 to 12 months. ANOVA’s conducted with the collected data indicated significant sex differences for fear, with female infants being reported as more fearful than male infants. No significant sex by age interactions were found, indicating an overall higher parent-report of fearfulness for female infants.

The data reported thus far in the present section provide support for male infants demonstrating greater approach-oriented behavior and female infants demonstrating more withdrawal and fearful behavior as demonstrated by parent-report measures. Although this does
constitute the majority of the parent-report literature as assessed through the current review, some parent-report data exist that suggest other results. One such study, conducted by Rose, Rose, and Feldman (1989) involved collecting parent-report data for 46 children, ages 2 to 5 years. When children were 2, 4, and 5 years old, mothers completed the Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1983), which assesses the dimensions of Internalizing and Externalizing, and also provides a score for total behavior problems. The Internalizing scale of the CBCL is a measure of inhibition, withdrawal, and other “problems within the self;” (Rose et al., 1989, p. 8). Although this scale is not a direct measure of fear, it is comprised of some components which are thought to be relevant to fearfulness (i.e., inhibition and withdrawal). In contrast to the other studies mentioned, the results of this study demonstrated that boys, but not girls, showed a significant increase in both Internalizing and Externalizing Behaviors between the ages of 2 and 5 years. Although mean maternal ratings of boys’ internalizing behaviors were somewhat lower than those of girls at age 2 years, ratings of boys’ internalizing behaviors at 4 and 5 years of age were higher than those of girls. These results may contradict the majority of the literature with regard to sex differences in fear and inhibition, or they may indicate that sex differences in fearful or inhibited behavior reverse or disappear as children reach middle childhood.

Zupančič and Kavčič (2005) conducted a study of gender differences in personality traits during early childhood with a sample of 192 Slavene children, which was based on mother-, father-, and teacher-reports when the children were 3, 4, and 5 years old. At each age, mothers, fathers, and pre-school teachers completed the Inventory of Child Individual Differences (Halverson et al., 2003), for each child in the sample. Results at 3 years of age indicated that boys were rated by all informants as more fearful and insecure than girls and that boys had
higher overall scores on Neuroticism based on parent-reports, although no significant sex differences were found for broad personality dimensions based on teacher-reports. Results at 4 and 5 years of age demonstrated similar patterns, with boys being rated as significantly more fearful and insecure than girls, across all informants. The authors point out that, although these findings were statistically significant and consistent across ages, the magnitudes of effects for sex were small at each age. The results of this study also appear to contradict the majority of the literature with regard to the direction of sex differences in levels of fear. This may, again, be indicative of shifts in fear levels from early to middle childhood, or may represent cultural differences between American and Slovene children and their parents’ ratings of their characteristics.

Adding to the mixed results with regard to sex differences in fear based on parent- and other-report data, the current literature review located one study based on parent-report of toddler temperament characteristics related to negative emotionality that found no significant sex differences. Spinrad and Stifter (2006) conducted a study of the relationship between infant temperament characteristics and their later empathic behaviors in response to the distress of others in toddlerhood. Relevant to the current topic of review, mothers of 98, 10-month-old infants completed the portions of the Infant Behavior Questionnaire (IBQ; Rothbart, 1981) that measured Distress to Novelty and Distress to Limitations. Distress to Novelty questions pertained to levels of fear, or inhibition, when exposed to novel stimuli. Results demonstrated no significant sex differences in mother-reported distress to novelty.

In summary, the results of the current literature review of parent- and other-report-based studies examining sex differences in fearfulness are indicative of female infants and young children demonstrating greater levels of fear than male infants and young children. However, the
results of this portion of the review are still somewhat mixed. Of 10 parent-report studies located that speak to sex differences in early fearfulness, 7 found greater levels of fear in females, 2 found greater levels of fear in males, and 1 found no significant sex differences in fear. The next section of the current paper will examine the results of observation-based research that pertains to sex differences in early fear.

Observation-Based Research

Similar to the results of parent- and other-report-based studies, the results of the review of observation-based literature in the area of sex differences in early fear are mixed, including some studies suggestive of greater fear in females, some suggestive of greater fear in males, and still others suggestive of no sex differences in fear. Unlike the above section, however, the review of observation-based literature demonstrates a majority of studies that indicate no significant sex differences in fear. For the sake of consistency, observation-based studies with the above outcomes will be reviewed in the same order as were the parent- and other-report studies, starting with those suggestive of greater fear in female infants and young children.

Maccoby and Jacklin (1973) conducted a study in which 40 (20 male, 20 female), 13- and 14-month-old children were exposed to a “loud angry male voice,” which was presented through a speaker in a playroom and was intended to serve as a fear-inducing stimulus (p. 35). The infants were video recorded and coded for movements toward and away from their mothers (including latency to move and distance), looks toward their mothers, touching or clinging to their mothers, and crying following the fear stimulus. The authors hypothesized that females would demonstrate longer latencies to move following the fear stimulus due to immobilization by fear. The results of this portion of the study failed to confirm the hypothesis, with males demonstrating significantly longer latencies to move following the fear stimulus than females. In
addition, no sex differences were found for increases in proximity to the mother following the fear stimulus or for behaviors involving clinging to the mother. A second experiment was conducted with 40 new children (20 male, 20 female), of the same age group to aid in the interpretation of the above-reported result of longer latencies to move for males and to see if the results of the first study could be replicated. In this experiment similar methodology was used, but half of the male, and half of the female, children were exposed to a “moderate” fear stimulus and the other half of each sex group was exposed to a “loud” fear stimulus. Results demonstrated that the “loud” stimulus (considered to be of greater intensity) elicited shorter latencies of movement toward the mother for both sexes than the “moderate” stimulus. This finding led the authors to conclude that the longer latencies to movement for males in the first experiment were indicative males demonstrating less fear, as opposed to more fear, than females. However, this sex difference in latency to movement was not replicated in the second experiment. The lack of sex differences with regard to increased proximity to the mother found in the first experiment was replicated in the second experiment. In sum, the results of the first portion of this study, when interpreted in the context of the results of the second portion, suggest that females may be somewhat more fearful than males due to their shorter latencies to move following a fear-inducing stimulus; however, this result was not replicated, and other data from this study are suggestive of no sex differences in fearfulness (i.e., proximity seeking).

A second observation-based study that shows some indication of sex differences in fearfulness was located in the current review of the literature. In this study, Hart, Carrington, Tronick, and Carroll (2004) examined the jealousy-related responses of 94, 6-month-old infants when their mothers directed attention toward a doll and ignored the infants. Although the primary interest in this study was that of jealousy responses, several affect-related expressions
were coded from video recordings of the laboratory sessions, including fear/wariness, based on the Affex system (Izard, Dougherty, & Hembree, 1980). Although fear was detected in only a small percentage of the infants in the laboratory situation, some analyses of sex differences were conducted on those infants who exhibited fearful expressions. No significant sex differences were found for presentation of fearful expressions, but a significant sex difference was found with regard to duration of fearful expressions, with females demonstrating longer durations of fearful expressions than males. Similar to the above study, this study indicates some area of greater fear-related behaviors in female infants, while also indicating other areas of fear (i.e., presence of fear expression), that do not demonstrate sex differences.

Observation-based data suggesting higher fearfulness in males at age 1 year were demonstrated in Gunnar-vonGnechten’s (1978) study of infant reactions to an animated novel stimulus that they could either control or not control. Forty-eight (24 male, 24 female) infants were exposed to a toy monkey that clapped with cymbals. Half of the infants of each sex did not have any means for controlling the initiation of the symbol-clapping, and the other half were taught to control the initiation of symbol-clapping by hitting a panel to trigger the monkey. Fear was measured by a coding system in which fussing and crying were rated throughout the session. Results demonstrated an interaction in which fear was high only for male infants in the non-controlling condition. Fearful behaviors for males were significantly lower in the controlling condition; whereas, fearful behaviors for females remained low in both conditions. Based on these data, male infants appeared to demonstrate more fearful reactions to a novel stimulus than females, particularly when they did not have control over the activation of the stimulus.

Despite the mixed results among the studies reviewed above, the majority of the observation-based studies located in the current review generally demonstrated a lack of sex
One such study was conducted by Gunnar (1980), and was an attempt to replicate the results of Gunnar-vonGnechten’s (1978) study and to compare the effects of control and predictability on 66 (33 male, 33 female), 1-year-old infants’ fearful responses. The methodology used for this study was similar to that used in Gunnar-vonGnechten’s study, described above, with the added component of a predicting condition, in which a bell was activated 1.4 seconds prior to the onset of the cymbal-clapping monkey. Fear was measured by coding for fussing/crying, touching the mother, and gaining proximity to the mother. No significant main effects of infant sex were found. A significant interaction of sex and condition was demonstrated, replicating the findings of Gunnar-vonGnechten’s study; specifically, only males demonstrated significantly more fearful behaviors in the noncontrolling condition than in the controlling condition. However, simple main effects within each condition indicated trends in which females demonstrated more fearful behaviors in the predicting condition ($p < .10$) and males demonstrated more fearful behaviors in the noncontrolling condition ($p < .10$). The overall results of this study are suggestive of no general sex differences in fearful responses to novel stimuli, although they do indicate that sex differences may be present based on the context in which a novel, or otherwise fear-eliciting, stimulus is presented. If this trend is, in fact, meaningful, it may account for some of the differences in observation-based results regarding sex differences in fear.

Bronson (1970) conducted a study of fear development utilizing the fear data from a larger longitudinal study which was aimed at gaining an increased understanding of mental and physical development from birth to 8 ½ years (see Jones & Bayley, 1941). In this study, fear in response to the novel laboratory assessment was measured by observation and developmentally appropriate coding systems for fear, including measures for such behaviors as crying and
wariness. Sixty infants (30 male, 30 female) were observed during laboratory assessments, which took place each month during the infants’ first 15 months of life, and then twice yearly through age 8 ½ years. Data were averaged over specific time periods, including 1-3 months, 4-6 months, 7-9 months, 10-15 months, 2-3 ½ years, 4-6 years, and 6 ½-8 ½ years. Although sex differences were found in terms of continuity of fearfulness, with males demonstrating more stability in fear-related problems than females, there were no sex differences found in the average level of fear at any age. Most relevant to the current topic of interest, this longitudinal, observation-based study demonstrated no significant sex differences in fear for any age group from birth to middle childhood.

Skarin (1977) conducted a study of infant fearfulness to strangers in which 32, 6- and 11-month-old infants were assessed for fear responses to a stranger in both home and laboratory settings and in conditions with the mother both present and absent. Fear responses were measured via coding of facial expressions and behaviors from tape-recorded sessions, as well as heart rate monitoring. Main effects of observed fearfulness were found for age, with 11-month-old infants expressing more fear than 6-month-old infants; for setting, with the laboratory setting eliciting greater fear than the home setting; for mother presence, with the mother-absent condition eliciting more fear than the mother-present condition; and for sex of stranger, with male strangers eliciting more fear than female strangers. Similar main effects were found for heart rate measures, with infants’ heart rates increasing more within the older age group, with the mother absent, and with male strangers. However, significant main effects for sex of infant on observed fearfulness and heart rate measures were not found, indicating that the sex of infants in this study did not appear to impact fear levels.
Kochanska (1991) conducted a study of inhibition in 88 children (47 female, 41 male), ages 2 ½ to 3 years, and their mothers, who had been previously diagnosed with unipolar depression (n = 32), bipolar depression (n = 17), or had no history of a mood disorder (n = 39). Children and their mothers were videotaped while interacting in a laboratory that was set up like an apartment. Of interest were responses to a novel, nonsocial stimulus (i.e., exploring the apartment), and a novel, social stimulus (i.e., a female stranger attempting to engage the child). Mother and child behaviors were coded with regard to three general categories, including the child’s proximity to the mother, the child’s approach or withdrawal from the novel stimuli, and the interaction of the mother and child. Relevant to the topic of review, no significant sex differences in overall inhibition were found. However, trends were found indicating that the male children were more inhibited with regard to the novel, nonsocial stimulus, whereas female children were more inhibited with regard to the novel, social stimulus. Although these trends may suggest some sex differences in fear with regard to the types of novel stimuli presented, the overall results of the study were not indicative of general sex differences in fear toward novelty.

In summary, the results of the observation-based portion of the current literature review examining sex differences in fearfulness are primarily indicative of no sex differences in the fear levels of infants and young children. However, like the previous section, the results of this portion of the review are somewhat mixed. Of seven observation-based studies located that speak to sex differences in fearfulness, two found some evidence of greater levels of fear in females, one found some evidence of greater levels of fear in males, and four found no significant sex differences in overall levels of fear. It is noteworthy, however, to point out that, even in the observation-based studies that were indicative of sex differences, those differences were small or nonreplicated, and only applied to specific types of novel stimuli. The next section
Studies Including Parent-Report and Observation-Based Measures

Based upon the current review, the literature representing studies that have included both a parent-report and an observation-based measure of infant temperament was less common than the literature representing only one of these types of measures. Like the above sections, the results with regard to these studies were not entirely consistent. However, the majority of these studies demonstrated no sex differences, regardless of methodology.

Of the studies located that included both types of methodology, only one reported some data to suggest sex differences in fear levels. Kivijärvi, Räihä, Kaljonen, Tamminen, and Piha (2005) conducted a study of 56 Finnish infants (19 male, 37 female), and their mothers. When the infants were 6 and 12 months of age, mothers completed temperament questionnaires, including the Revised Infant Temperament Questionnaire (R-ITQ; Carey & McDevitt, 1978) and the Toddler Temperament Questionnaire (TTQ; Fullard, McDevitt, & Carey, 1984), respectively. Infant temperament-related behavior was also recorded during an at-home, free play period with the mother when infants were 3 and 12 months of age. These episodes were coded using the Parent-Child Early Relational Assessment Scale (PCERA; Clark, 1980, 1985). Results based on the mother-report data were indicative of significant sex differences for approach/withdrawal, mood, and activity, with females demonstrating more withdrawal and less positive mood than males at 6 months, and females demonstrating more withdrawal and less activity than males at 12 months. Sex differences based upon the observed episodes were not reported. However, it was reported that the characteristics of infant temperament observed via the PCERA were not significantly correlated with those reported by mothers via the R-ITQ or the TTQ. Given that
these temperament measures were not correlated and no sex differences were reported with regard to the observation-based measure, it is reasonable to assume that no sex differences were found based upon the PCERA-assessed temperament characteristics.

Rothbart (1986) conducted a longitudinal study of temperament when infants were 3, 6, and 9 months of age, using both mother-report on the Infant Behavior Questionnaire (IBQ; Rothbart, 1981), and home observations at each age that were assessed by trained coders. Both types of measures included an assessment of fear. Forty-six infants were studied (23 male, 23 female). Unlike the previously-reported study, considerable correlations were found between mother-report and observation-based methods. Specifically, fear levels were significantly correlated between the two types of methodology at 3 and 9 months of age, although not at 6 months of age. No sex differences were found for fear levels, regardless of age or methodology used.

In another study using both parent-report and observation-based measures, Kiel and Buss (2006) examined the relationships between sex and fear, among other factors (i.e., maternal personality, maternal accuracy of predicting child fear, and context of a novel stimulus), in 72 (39 male, 33 female), 24-month-old children. Children’s responses were recorded during their involvement in several activities in the laboratory, which included portions of the toddler version of the Laboratory Temperament Assessment Battery (LAB-TAB; Buss & Goldsmith, 2000). The episodes used for this study were designed to elicit inhibition or approach (i.e., exploration of a “Risk Room,” responses to a “Stranger Approach,” and interactions with a stranger following a stranger approach during free play), and anger or sadness (i.e., responses to a toy locked in a clear box, having a toy taken away, receiving an empty present, and a “Gentle Arm Restraint” by the mother to keep the child from playing with an attractive toy). Facial expressions and
behaviors indicating fear, anger, or sadness were coded for presence and intensity. A composite score for fearful behaviors was computed for each child. In addition, mothers completed the Toddler Behavior Assessment Questionnaire (TABQ; Goldsmith, 1996), from which the Social Fear scale was used as a source of parent-reported social inhibition. Results indicated no significant sex differences for either the laboratory-based fear composite or the parent-report scores on the Social Fear scale of the TABQ.

Finally, de Rosnay and colleagues (2006) conducted a study in which 24 mothers of infants between the ages of 12 and 14 months (12 male, 12 female) were asked to complete the IBQ (Rothbart, 1981), and then to bring their infants in for a laboratory appointment. At the laboratory appointment, mothers were instructed to interact with a stranger in either a socially anxious or a non-anxious manner in the presence of their infants. Following this interaction, the stranger approached, and attempted to engage, the infant while the mother read a magazine. After the first stranger left, a second stranger entered to engage the mother and then the infant in the same way. Each mother-child dyad experienced one episode in which the mother interacted in a socially-anxious manner (as instructed), and one episode in which the mother interacted in a non-anxious manner. Infants’ subsequent reactions to the strangers’ approaches were video recorded and coded for fearful expressions, fearful behaviors, and looks toward the mother. Results demonstrated no significant sex differences in fearfulness based on either the parent-report or laboratory-assessed data.

In summary, fewer studies were located that included both parent-report and laboratory-based measures of fear than those using only one type of measure. Of these, only one demonstrated evidence suggestive of a sex difference in fear, and the data that supported this sex difference included only the parent-reported data. The other located studies in this group were
consistent in that they did not find evidence of sex differences in fear based on either type of measure.

Summary and Discussion of Literature Review Results

The literature depicting research involving fear levels in infancy and young childhood has been reviewed in the present paper to examine sex differences and possible moderating effects of fear outcomes. The research was divided into three groups: studies involving only parent-report and/or other-report measures of fear, studies involving only observation-based measures of fear, and studies involving both parent-report and observation-based measures of fear. All three groups of studies included some mixed results with regard to sex differences in fear levels, but each group had a somewhat different trend. Of the studies only involving parent- and/or other-reports of fear, the majority demonstrated evidence of sex differences, with females reported as displaying more fear than males. Of the studies only utilizing observation-based measures of fear, the majority demonstrated no significant sex differences. The studies utilizing both parent-report and observation-based measures of fear almost exclusively resulted in data demonstrating no sex differences, with the exception of one study, in which the parent-report portion, but not the observation-based portion, was indicative of females demonstrating more fear than males (i.e., Kivijärvi et al., 2005).

Based upon the current review of the literature, methodology may serve as a moderating factor in the determination of sex differences in fear for infants and young children. Indeed, the results of this review demonstrate that the majority of the data indicating that female infants and young children are more fearful than male infants and young children come from parent- or other-report data, and that these sex differences are less often demonstrated by observation-based data. If methodology is, in fact, a moderator of sex effects on fear levels, then this may represent
a somewhat sex-biased approach of parents and other informants when interpreting infants’ and young children’s potential signals of fear. This is a distinct possibility, given that sex stereotypes of fearfulness have been found to depict females as more fearful than males (Maccoby & Jacklin, 1974, p. 343-344), and facial expressions of fear have been found to be among the most ambiguous and most often misinterpreted of emotional expressions (Kirouac & Doré, 1983). In addition, one of the parent-report studies reviewed that found females to be more fearful than males (i.e., Nagy et al., 2001), demonstrated those differences within the first 20 weeks of life, despite there being a generally large consensus that the fear system does not come online until around the second half of the first year (Bronson, 1970; Rothbart & Bates, 1998). If this developmental timeline for the fear system is accurate, Nagy and colleagues’ result may be more indicative of maternal misinterpretations of ambiguous facial expressions than actual differences in infant levels of fear.

It is also important to consider other interpretations of the results of the current literature review. An alternative factor that could be moderating the findings regarding sex differences in fear is sample size. In general, studies involving observation-based measures have smaller sample sizes due to the constraints of time, money, and recruiting potential for these labor-intensive studies. In contrast, studies based upon only parent- or other-report questionnaires provide a greater capability for recruitment and retention of larger samples of participants. Indeed, this trend appears to be present in the current literature review, with the studies based on only parent- and/or other-report data including samples sizes between 46 and 957 (with all studies that found females to be significantly more fearful including 100 or more participants), and studies involving observation-based measures, including those with only observation-based measures and those including both types of methodology, involving sample sizes between 32 and
94. As indicated by Else-Quest and colleagues’ (2006) meta-analysis, if a sex difference in early fear does exist, it is likely to be of a small magnitude. Based on this information, it is possible that the different trends between parent- and/or other-report-based research and research that involves at least some observation-based measure is not due to a parent-report bias related to sex stereotypes about fear, but may, instead, be due to the typically-limited sample sizes in observation-based research and their subsequent lack of statistical power to identify small effects.

Present Study

The current review, described above, provides a greater understanding of the literature that presently exists with regard to sex differences in early fear levels, and it leads to continued directions for research in this area. Specifically, the current literature contains mixed results with regard to early sex differences in fear, with trends toward females demonstrating more fear than males as indicated by parent- and other-report data, and trends supporting no significant sex differences in studies that include an observation-based measure. It remains unclear which factor or factors are moderating these effects. It is possible that parent- and other-reporters are susceptible to sex stereotypes when interpreting and reporting fear-related behaviors of infants and young children, and therefore report in a biased manner. It is also possible that small sex differences in fear do exist, and that only studies with large samples, generally informant-report-based studies, have sufficient statistical power to find such small effects.

Given both of the above-described possibilities, the first portion of the present study sought to determine whether or not the type of methodology used to measure fear in infancy (i.e., parent-report or laboratory observation) was likely to moderate the relationship between child sex and fear levels in a relatively large sample, based upon a comparison of the consistency
between parent-reported and laboratory-observed fear in male and female infants. Data from two samples of infants whose levels of fear were measured within the first year of life, both by trained observers following a standardized laboratory exercise and by parent-report, were used to determine whether or not the type of measure used would result in different outcomes with regard to fear levels for each sex. It was hypothesized that a moderation effect would be suggested by a stronger relationship occurring between parent-reported and laboratory-observed measures of fear for infants of one sex than the other.

In addition, this sample was analyzed to determine its level of consistency with previous research with regard to early sex differences. Specifically, two t-tests were conducted to examine sex differences at 12 months based upon parent-report and laboratory observation, separately. Based upon the results of the current literature review, it was hypothesized that a significant sex difference in fear levels would be found for parent-report-based data, but not for laboratory observation-based data.

One of the two samples included in the first portion of the present study was followed up at toddler age via parent-reports of temperament, as well as internalizing and externalizing behaviors. Data from the fear scale of the temperament measure for this group were employed to assess the presence of a sex difference in parent-reported fear in a somewhat smaller sample at toddler age (n = 85). Based upon the above described results of the literature review of parent-reported early fear, it was hypothesized that a significant sex difference would be found in this data set, with females reported to be more fearful than males.

Finally, the present study sought to determine which measure of infant fear would be a better predictor of internalizing behaviors in toddlerhood. Given what we know of the likely connection between fear and later internalizing problems (e.g., Goldsmith & Lemery, 2000;
Kagan et al., 1999), the ability of a fear measure to predict later internalizing behaviors may be a useful indicator of the validity of that measure. Therefore, the present study included the goal of determining whether a parent-report measure or a laboratory observation-based measure of early fear would better predict internalizing behaviors at toddler age, and whether or not this predictive efficiency would be dependent upon the sex of the child. If this were to be the case, the answer to the question regarding the predictive validity of observations and parent-report of infant fearfulness would be qualified by the sex of the child, wherein one type of methodology would be superior for one of the sexes, but not the other. The follow-up data, described above, was used for an analysis of the predictive abilities of child sex, parent-reported fear at 12 months, laboratory-observed fear at 12 months, and the interactions of child sex and each of the 12-month measures of fear for internalizing behaviors at toddler age. Based on the direction of typical gender stereotypes and the related potential for parent bias (Maccoby & Jacklin, 1974, p. 343-344), it was hypothesized that analyses conducted in the context of this portion of the study would result in a significant interaction, wherein parent-reported fear in infancy would account for a greater amount of variance in internalizing behaviors for males, and laboratory-observed fear would be a superior predictor of later internalizing behaviors for females.
CHAPTER TWO

Methods

Participants

As indicated above, two samples recruited from different locations were used in the present study. The first sample was recruited from the San Francisco Bay area in California and consisted of 68 families who completed a laboratory assessment and a set of questionnaires when their infants were 6, 9, or 12 months of age. Infants were recruited to approximate equivalent age and gender distributions. Of these infants, 19 were 6 months of age, 25 were 9 months of age, and 24 were 12 months of age at the time of assessment. Infants were considered to be of these age categories if they were within 2 weeks of each exact age. Only the data from the 12-month-old infants in this sample were used for the purposes of the present study. Of the 24, 12-month-old infants, 20 had both laboratory and IBQ-R data. Of these 20 infants, 10 were female and 10 were male. Nineteen of the participating mothers were married, and one did not report her marital status. As identified by their mothers, 17 of the 12-month-old infants were Caucasian/European, 2 were Asian, and 1 was Filipino.

The second sample was recruited from the Eastern Washington area. Parents and infants in this sample participated in laboratory assessments and parents completed questionnaires when infants were 4, 6, 8, 10, and 12 months of age. Like the California sample, infants were considered to be of the above age categories if they were within 2 weeks of each exact age. Infants were recruited for this sample to approximate a similar number of female and male participants. Infants in this sample were also followed-up via parent-report at toddler age. For the purpose of the current study, the 12-month parent-report and laboratory data, as well as toddler-age follow-up data for those 12-month-old infants were used. Twelve-month data were
complete for 92 participants (48 male, 44 female). The infants from this sample who participated in the 12 month data collection were determined not to be significantly different than the infants who did not participate in 12 month data collection for infant sex, family socioeconomic status, or parent-reported fear via the IBQ-R fear scale at 4 months of age. Parents reported reasons for attrition prior to the 12-month assessment, including being too busy (12), experiencing difficulty finding times to schedule appointments (4), living too far away (2), having no transportation (2), leaving for an extended vacation (1), having a child with a disability (1), and parent depression (1). In addition, three families discontinued participation without stating an explanation. Other reasons for attrition included families moving (11) or being unavailable for contact to schedule due to phones being disconnected or several unreturned phone calls (15).

The total follow-up sample included 85 infants (46 males, 39 females), 73 (36 male, 37 female) of whom also had data points for both types of measures at 12-months. Reasons for exclusion of participants in the follow-up sample included inability to contact families for recruitment due to moving, changes in telephone numbers, or failure to make contact (21), and parents reporting being too busy to participate (1). In addition, reasons for attrition of the participants who were initially recruited for the follow-up study included failure to return packets following several reminder phone calls (16), and reporting being too busy to complete follow-up paperwork (1). Participants who took part in both the 12-month assessment and the follow-up assessment were determined not to be significantly different than those who did not participate at both of these time points for child sex, family socioeconomic status, or 4-month parent-reported fear levels. Follow-up data for each of the included infants were used in the present study for the purposes of assessing parent-reported sex differences in fear at toddler age. However, only the
follow-up data of those who also participated in the 12-month parent-report and laboratory assessment were used for the purposes of determining the predictive abilities of the different infant fear measures for internalizing behaviors at toddler age.

The 12-month data from the California sample, along with the 12-month data from the Washington sample, were used for evaluating differences in fear scores based on either parent-report or laboratory-observation for male and female infants. This provided a sample of 112 participants. The follow-up data from the Washington sample were used to examine sex differences in parent-reported fear at toddler age. This provided a sample of 85 (46 male, 39 female) participants. The 12-month data from the Washington sample, in addition to the follow-up data, were used to examine the predictive abilities of child sex, parent-reported fear at 12 months, laboratory-observed fear at 12 months, and the interactions of child sex and each of the 12-month measures of fear, for internalizing behaviors at toddler age. This provided a sample of 73 participants.

*Measures*

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

The IBQ-R is a rationally-derived, fine-grained assessment tool that uses parent-report to measure 14 dimensions of infant temperament. These dimensions are depicted by 14 scales that load onto three larger factors: Surgency/Extraversion (including scales for Approach, Vocal Reactivity, High Intensity Pleasure, Smiling and Laughter, Activity Level, and Perceptual Sensitivity), Negative Affectivity (including scales for Sadness, Distress to Limitations, Falling Reactivity (negatively loading), and Fear), and Orienting/Regulation (including scales for Low Intensity Pleasure, Cuddliness/Affiliation, Duration of Orienting, and Soothability). Each of these scales has demonstrated sufficient internal reliability, with Cronbach’s alphas ranging from
.77 to .96 (Gartstein, Slobodskaya, & Kinsht, 2003). The scale for fear, which loads onto the Negative Affectivity factor and has demonstrated a Cronbach’s alpha of .89 (Gartstein, Slobodskaya, & Kinsht, 2003), was used as a parent-report measure of fear for the present study. *The Temperament Laboratory Assessment (TLA; Gonzalez, Gartstein, Carranza, & Rothbart, 2003)*

The TLA is intended for use with children between the ages of 6 and 12 months. It consists of 11 laboratory episodes designed to elicit regulatory and reactive features of infant temperament. Scores from the TLA provide indices for threshold, latency, intensity, time to peak intensity, and recovery time for reactions involving affect arousability, motor activity, and related responses. The TLA is based on the LAB-TAB (Goldsmith & Rothbart, 1996), which was designed to be used in conjunction with the IBQ-R. The LAB-TAB is widely used and has been consistently described as reliable and valid, with inter-rater agreement ranging from 87% to 100%. Convergence among latency, intensity, and duration measures of expressions of positive affect (e.g., smiling and laughter), fear, and anger have been demonstrated with an average correlation of .68 (Goldsmith & Rothbart, 1991). In addition, preliminary analyses of the TLA have demonstrated acceptable estimates of inter-rater reliability (r’s between .64 and 1.00).

For the current study, the Presentation of Masks episode from the TLA was employed as an observation-based indicator of levels of infant temperamental fear. During this episode in the laboratory, infants were shown a series of four different masks for 10 seconds each. The coding scheme for this episode accounts for the intensity of facial, vocal, and bodily fear, as well as attempts to escape the novel stimuli. Episodes were also coded for the presence of smiling.
The Early Childhood Behavior Questionnaire (ECBQ; Putnam, Gartstein, & Rothbart, 2006)

The ECBQ is a fine-grained measure of toddler temperament that utilizes parent-report. It was developed for use with children between 1.5 and 3 years of age, and assesses aspects of temperament similar to those assessed by the IBQ-R, utilizing questions that are age-appropriate for toddlers. Some scales are included in the ECBQ that are not part of the IBQ-R because of developmental appropriateness. The ECBQ uses 18 scales to assess temperament in toddlerhood. When factor-analyzed, the ECBQ demonstrated factor loadings similar to those of the IBQ-R, with scales loading onto three main factors: Surgency/Extraversion (including scales for Impulsivity, Activity Level, High-intensity Pleasure, Sociability, and Positive Anticipation), Negative Affectivity (including scales for Discomfort, Fear, Sadness, Frustration, and Soothability (loading negatively), Motor Activation, Perceptual Sensitivity, and Shyness), and Effortful Control (including scales for Inhibitory Control, Attention Shifting, Low-intensity Pleasure, Cuddliness, and Attention Focusing). The ECBQ has been demonstrated to have acceptable internal consistency and discriminate validity. With the exception of Positive Anticipation, all scales have been demonstrated to show statistically significant stability over time, with correlations between .32 and .79 over 6 months and between .35 and .63 over 18 months (Putnam, Gartstein, & Rothbart, 2006). For the present study, the ECBQ was used both for assessing sex differences in parent-reported fear at toddler age and in order to control for concurrent fear when assessing the predictive abilities of child sex, parent-reported fear at 12 months, laboratory-observed fear at 12 months, and the interactions of child sex and each of the 12-month measures of fear for internalizing behaviors at toddler age.
The Child Behavior Checklist for ages 1.5 to 5 years (CBCL/1.5-5; Achenbach & Rescorla, 2000)

The CBCL/1.5-5 is a revision of the CBCL/2-3 (Achenbach, 1992), and was developed as a parent-report measure to assess childhood behavior problems between the ages of 1.5 and 5 years. Parents are asked to rate 99 specific problem behaviors with regard to how true each behavior has been for their child in the past 2 months. Parents are also asked to give descriptions of many behaviors and to report any problem behaviors that were not listed specifically in the questionnaire. Items on the CBCL/1.5-5 load onto seven syndrome scales, including Emotionally Reactive, Anxious/Depressed, Somatic Complaints, Withdrawn, Sleep Problems, Attention Problems, and Aggressive Behavior. These syndrome scales further load onto two groupings of syndromes: Internalizing and Externalizing. The Internalizing grouping includes the Emotionally Reactive, Anxious/Depressed, Somatic Complaints, and Withdrawn syndromes, whereas the Externalizing grouping includes the Attention Problems and Aggressive Behavior syndromes. The CBCL/1.5-5 is a widely used measure for the assessment and research of child internalizing and externalizing behavior problems, and has been shown to have acceptable overall psychometric properties. The CBCL/1.5-5 demonstrates test-retest reliabilities between .68 and .92, all of which are significant at $p < .01$, and inter-rater reliabilities between .51 and .67, all of which are significant at $p < .05$. All scales of the CBCL/1.5-5 have been demonstrated to significantly differentiate referred from nonreferred children (Achenbach & Rescorla, 2000). For the present study, the CBCL/1.5-5 was used as a measure of internalizing behaviors at toddler age.
Procedures

California Data

Infants were located for recruitment through birth announcements in local newspapers, and families were called approximately 2 weeks prior to the time that their infants would be eligible for the study. Each participant in the California sample was only assessed at one age (6, 9, or 12 months). Parents were asked to complete the IBQ-R as a parent-report measure of infant temperament. Mothers and infants also attended a laboratory session based on the TLA. Laboratory sessions took about an hour, and parents received a $25 reimbursement upon completion of the assessment.

Eastern Washington Data

Infants in the Washington sample were located through local birth announcements, as well as by advertisement through local community-based organizations and programs (e.g., Whitman and Latah Counties’ Ages and Stages Early Intervention Project), medical centers, and pediatricians. Prospective families were subsequently contacted by telephone approximately 2 weeks before their infants were 4 months of age. The parents were informed about the nature of the study and their participation, including the time demands and reimbursement schedule. Participants in this sample were assessed at 4, 6, 8, 10, and 12 months of age. Among other questionnaires that were not utilized for the current study, parents were asked to fill out the IBQ-R, and mothers were asked to complete a laboratory assessment based on the TLA with their infants at each of these ages. Each laboratory session from ages 6 to 12 months took about an hour. A developmentally appropriate abbreviated form of the laboratory assessment was utilized when infants were 4 months of age. This session took about 15 minutes. Upon the completion of this portion of the study, participants received a $100 reimbursement. For the purposes of the
current study, only the data from the 12-month IBQ-R and 12-month laboratory appointments were used.

Participants in the Washington sample who completed the 12-month assessment were recruited for follow-up at toddler age. Parents were asked to complete the Child Behavior Checklist for ages 1.5 to 5 years (CBCL/1.5-5; Achenbach & Rescorla, 2000), and the Early Childhood Behavior Questionnaire (ECBQ; Putnam, Gartstein, & Rothbart, 2006). Parents were given a $10 reimbursement for completing these follow-up questionnaires.

Analytic Strategy

Preliminary analyses were required for data collected within the Washington sample to ensure that the participants whose data were utilized to test the proposed hypotheses were not significantly different from non-responders (i.e., participants who did not complete the entire 12 month assessment or failed to participate during the toddler evaluation). To this end, t-tests were first computed to compare those participants who completed both fear measures at 12 months of age to those who did not, to ensure no systematic influence of attrition or missing data, examining family socioeconomic status and infant IBQ-R fear at 4 months of age as dependent variables. A chi-square analysis was also conducted to determine whether or not there was a difference in the distribution of child sex between these groups. In addition, participants who completed both measures of fear at 12 months and the follow-up data were compared to those who did not via t-tests for family socioeconomic status and IBQ-R fear at 4 months. Similarly, a chi-square analysis was also conducted to compare the distribution of child sex for these two groups.

The first research question for the present study was whether or not parent-reported levels of infant fear would be more consistent with laboratory-observed fear levels for infants of one
sex over the other. To answer this question, 12-month data were utilized from both the sample collected in California and the sample collected in Washington, to provide a sizeable sample. This age is of particular interest because the fear system is generally thought to be firmly online by 12 months (Rothbart & Bates, 1998). Using this data, two correlations were conducted, one correlating parent-report and laboratory observation-based fear scores for male participants and one correlating parent-report and laboratory observation-based fear scores for female participants. The fear scale of the IBQ-R was used as the measure of parent-reported fear, and the composite fear score from the Presentation of Masks episode of the TLA, including coded intensity of fear expression, intensity of bodily fear, intensity of distress vocalizations, and intensity of escape behavior, was used as the laboratory observation-based measure of fear. The magnitudes of these correlations were compared to determine if, as hypothesized, the fear measures would show a significantly stronger correlation for infants of one sex than the other, which would suggest a moderating role of measure type on the relationship between infant sex and level of fear.

Next, 12-month data were analyzed to examine the presence or absence of a significant sex difference in fear levels based upon parent-report and laboratory observation, separately. Two t-tests were conducted to compare male and female levels of fear at 12-months, based upon the IBQ-R fear scale and the fear scores obtained through laboratory observation of the Presentation of Masks episode of the TLA. Based upon the current review of the literature, it was hypothesized that a significant sex difference would be found based upon parent-reported fear data, but that no significant difference would be found based upon laboratory observations of fear.
In addition, the present study examined parent-reported sex differences at toddler-age for those participants from the original Washington sample who participated in the follow-up study when they were between 18 and 33 months of age. The fear scale of the ECBQ was assessed using a one-tailed t-test to examine sex differences in parent-reported levels of fear at toddler age. It was hypothesized that parents would report female toddlers to be more fearful than male toddlers.

Finally, a hierarchical multiple regression was conducted, controlling for concurrent fear as measured by the fear scale of the ECBQ, and aimed at determining the predictive abilities of child sex, parent-reported fear at 12 months (measured via the IBQ-R fear scale), laboratory-observed fear at 12 months (measured via the composite score from the Presentation of Masks episode of the TLA), and the interactions of child sex and each 12-month fear measure, for the CBCL/1.5-5 measure of internalizing behaviors. Each of the independent variables was centered to minimize problems related to multicollinearity.
CHAPTER THREE

Results

Preliminary Analyses

Preliminary analyses sought to determine whether or not those participants included in the analyses differed from those who were excluded due to attrition or missing data. The first set of t-tests conducted compared those participants who completed both fear measures at 12 months of age to those who did not. No significant differences were found between these two groups based upon family socioeconomic status or IBQ-R fear at 4 months (see table 1). Results from a chi-square analysis also indicated no significant difference of the distribution of child sex between these groups (Chi-Square = .362, \( p = .547 \)). The second set of t-tests compared those participants who completed both measures of fear at 12 months of age and the follow-up data at toddler age to those who did not. Similarly, no significant differences were found between these two groups based on family socioeconomic status or IBQ-R fear at 4 months (see table 2). In addition, results of a chi-square analysis demonstrated no significant differences in the distribution of child sex between these groups (Chi-Square = .356, \( p = .551 \)).

Consistency of Parent-Reported and Laboratory-Observed Fear Levels for Males and Females

Data collected from the California and Washington samples were utilized to examine the consistency between parent-report and laboratory observation measures of fear for male and female infants separately, and then to compare the magnitudes of the relationships for each sex. First, correlations were computed for male and female infants, utilizing parent-reported (IBQ-R fear scale) and laboratory-observed (Presentation of Masks episode of the TLA) measures of fear. Results demonstrated a statistically significant \( (p < .05) \) correlation between parent-reported and laboratory-observed fear levels for female infants, but not for male infants (\( r = .29 \),
Next, the magnitudes of these correlations were compared based on their confidence intervals, as described by Zou (2007). The 95 percent confidence intervals for female and male infants were $r = .03$ to $.57$, and $r = -.14$ to $.38$, respectively. Using Zou’s (2007) method, the lower bound for the interval of the difference between the correlations was $r = -.20$, and the upper bound for the interval of the difference between the correlations was $r = .55$. The inclusion of zero within this interval suggests that it is possible that there is no difference between the correlations at the population level. It must, therefore, be concluded that the consistency between parent-reported and laboratory-observed measures of fear may not be significantly different as a function of infant sex.

**Determining Sex Differences in Fear at 12 Months Based on Both Measure Types**

Two t-tests were conducted to determine whether or not sex differences would be found within the 12-month data for parent-reported and laboratory-observed fear levels. Based upon the current review of the literature, it was hypothesized that a significant sex difference would be found for parent-reported fear (i.e., the IBQ-R fear scale), but not for laboratory-observed fear (i.e., the Presentation of Masks episode of the TLA). The results of these analyses failed to support the hypothesis for parent-report data, indicating no significant sex differences in fear levels for either measure (see table 3).

**Comparing Parent-Reported Fear for Male and Female Toddlers**

A one-tailed t-test was computed to test the hypothesis that parents would report higher levels of fear in female toddlers than male toddlers. Follow-up ECBQ fear data collected from the Washington sample were used to conduct this analysis. Based upon the significance criteria for a one-tailed t-test ($p \leq .1$), results supported the hypothesis ($t = -1.885, p = .06$), indicating
that female toddlers were reported by parents as demonstrating higher levels of fear than male toddlers (see table 4).

_Determining Predictors for Internalizing Behaviors at Toddler Age_

A hierarchical multiple regression was computed to examine the predictive abilities of infant sex, parent-reported fear at 12 months (IBQ-R fear scale), laboratory-observed fear at 12 months (Presentation of Masks episode of the TLA), and the interactions of child sex and each measure of fear, with toddler internalizing behaviors serving as the dependent variable (CBCL/1.5-5, Internalizing Behaviors scale), controlling for concurrent fear at toddler age (ECBQ fear scale). Parent-reported fear levels at toddler age (measured via the ECBQ fear scale) were entered into the first step of the regression equation. The second step included child sex. The third step included the 12-month IBQ-R fear scale scores, and the 12-month laboratory-based fear scores. The fourth step included the interaction of child sex and 12-month IBQ-R fear scale scores, and the fifth step included the interaction of child sex and 12-month laboratory-based fear scores. Results of this analysis indicated a general model that accounted for a significant portion of the variance in toddler-age internalizing behaviors (R Square = .203). However, only concurrent parent-reported fear at toddler age accounted for a significant portion of the variance (R Square = .176), indicating that child sex, parent-reported fear at 12 months, laboratory-observed fear at 12 months, and the interactions of child sex and each of the fear measures did not account for a significant portion of the variance for predicting internalizing behaviors at toddler age (see table 5).
CHAPTER FOUR

Discussion

Summary and Discussion of Findings

Prior to the analyses associated with the primary research questions in the present study, preliminary analyses were conducted to ensure that participants contributing data to the tests of the proposed hypotheses did not differ significantly from those excluded due to attrition/missing data on variables including child sex, family socioeconomic status, or early fear as assessed by the IBQ-R fear scale at 4 months of age. Results of two chi-square analyses and four t-tests demonstrated no significant differences in any of these areas when comparing participants who did and did not complete both fear measures at 12 months of age, and when comparing participants who did and did not complete the toddler-age follow-up.

The first research question sought to determine whether or not parent-reported fear was consistent with laboratory-observed fear at 12 months of age as a function of the child’s sex. The purpose of this research question was to determine whether or not parent-reported fear was more consistent with laboratory-observed fear for one sex of infant over the other. This was considered to be an important question because a sex difference in the level of consistency would suggest that one type of measure may be more accurate than the other for a particular sex. Initial correlations between these two measures of fear demonstrated a statistically significant correlation between parent-reported and laboratory-observed fear for females, but not for males. The magnitudes of these correlations were compared using a statistical method described by Zou (2007), in which confidence intervals are determined for correlations to establish a confidence interval for the difference between correlations. The confidence interval of the difference between these correlations was found to include zero, which indicates that there may be no
difference between the magnitudes of these correlations. Based upon this result, it must be concluded that it is possible that there is no difference between the discrepancies of parent-reported and laboratory-observed fear for males versus females. However, this method also provides additional information regarding a potential difference. Specifically, the lower bound for confidence interval of the difference between correlations was -0.20, and the upper bound was 0.55, which represents a large range of possible differences. This result indicates that, although it is possible that there is no difference between the correlations for males versus females, it is also possible that there is a difference as large at 0.55 (a large effect size), which would indicate that the correlation between measures was significantly greater for females than males. Therefore, although the results of the present study do not indicate that the discrepancy between parent-reported and laboratory-observed measures of fear is significantly different for males versus females, further research using larger sample sizes would be necessary to enable firm conclusions with regard to this question.

The second set of analyses was conducted to examine potential sex differences in fear levels at 12 months of age for each individual measure (i.e., IBQ-R and the TLA Presentation of Masks). This question was of interest to determine whether or not the current sample would replicate the results of previous research. Based upon the results of the current literature review, which demonstrated parent-report measures of fear to be more likely to indicate sex differences than laboratory observed measures of fear, it was hypothesized that a significant difference would be found based upon the IBQ-R fear scale, but on based upon the Presentation of Masks episode of the TLA. Results of these analyses only partially supported the hypotheses, demonstrating no significant differences based upon either measure of fear at 12 months.
The third research question posed by the current study was whether or not parent-reported fear levels would differ for the two sexes at toddler age. This research question was considered to be important to determine whether or not the current sample would demonstrate consistency with previous research that has used parent-report to determine early sex differences (e.g., Richman, Stevenson, & Graham, 1975; Carey & McDevitt, 1978; Earls, 1980; Gartstein & Rothbart, 2003). Based upon previous parent-report-based research, it was hypothesized that parents would report females to be more fearful than males at toddler age. A one-tailed t-test of the follow-up data collected from the Washington sample supported this hypothesis, indicating that parents reported females as significantly more fearful than males at toddler age (see table 4). This result suggests that the data collected from the follow-up sample were consistent with the findings of previous research indicating that parents report higher levels of fear for females relative to males.

The final research question addressed by the current study sought to determine whether child sex, 12-month parent-reported fear levels, 12-month laboratory-observed fear levels, and the interactions of each of these 12-month fear measures with child sex would predict parent-reported internalizing behaviors at toddler age, when concurrent fear levels were controlled. This question was considered to be important for several reasons. First, determining whether or not child sex accounts for a significant amount of the variance of internalizing at toddler age would provide additional evidence about sex differences in early fear levels. Second, because the above-reported review of previous research demonstrates discrepancies in the results of parent report- and laboratory observation-based indices of early sex differences in fear, it is important to determine which of these proves to be a superior predictor of later outcomes. Finally, of particular interest in the current study were the predictive abilities of the interactions
between child sex and 12-month parent-report data and between child sex and 12-month laboratory-observed data. These interactions were included to address a possible moderating effect of type of fear measure on the relationship between child sex and internalizing problems at toddler age. Specifically, a significant interaction would suggest that one measure was a better predictor of later internalizing behaviors than the other for males versus females.

Results of the hierarchical multiple regression demonstrated that none of the target variables accounted for a significant portion of the variance in internalizing behaviors at toddler age. However, the control variable, parent-reported fear levels at toddler age, as measured by the ECBQ fear scale, did account for a significant portion of the variance, suggesting a relationship between concurrent fear levels and internalizing behaviors at toddler age, as reported by parents. The data of interest from this portion of the analyses did not support a moderating effect of measure type for the relationship between child sex and internalizing behaviors at toddler age.

The results of the present study are in line with previous research in several ways. First, although the comparison of male and female fear levels at 12-months only partially supported the hypothesis that parent-reported fear, but not laboratory-observed fear, would demonstrate sex differences, it was also somewhat in line with previous research. Specifically, these outcomes were similar to those found in other studies that have included both parent-report and laboratory-observed measures of early fear (e.g., Rothbart, 1986; Kiel & Buss, 2006; deRosnay et al, 2006). Based on these studies, no significant sex differences were found in early fear based on parent-report or laboratory observation. In addition, the results of a t-test of sex differences in parent-reported fear at toddler age demonstrated results consistent with previous parent-report-based research (e.g., Richman, Stevenson, & Graham, 1975; Hsu et al, 1981; Gartstein & Rothbart, 2003), which has indicated significant sex differences, with females being reported as
demonstrating higher levels of fear than males. Given that these trends are consistent with previous literature and that sex differences were found in the present sample for participants at toddler age, but not at 12 months, the current study lends evidence that sex differences in fear may increase over early development, and that these differences may not be apparent until toddler age.

It is also possible that trajectories of fear development differ for males and females, resulting in mixed outcomes for studies of sex differences, depending upon time of assessment. Specifically, Skarin (1977) indicated no sex differences in fear at 6 or 11 months, but increases in fear for both males and females between these ages. This is consistent with the present study, which demonstrates no sex differences at 12 months. However, based upon the results of toddler-age analyses of fear in the present study, parents report females as more fearful than males at this age. This may indicate a faster progression of fear development for females than males during this developmental period. Furthermore, Rose, Rose, and Feldman’s (1989) results indicated that, although females demonstrated somewhat greater fear at 2 years of age, male children demonstrated greater increases in fear over time between the ages of 2 and 5 years. Furthermore, the recent results of Zupancic and Kavcic’s (2005) study demonstrated greater fear levels in male than female children at ages 3, 4, and 5 years. Based upon these studies, it is possible that males and females demonstrate different rates of fear development at different ages, with females showing more rapid fear development between late infancy and toddler age and males showing more rapid fear development in early childhood. However, this conclusion does not serve to reconcile all of the literature on early fearfulness, as several parent-report studies of infancy have shown early sex differences in fear (e.g., Earls, 1980; Carey & McDevitt, 1978; Maziade et al,
1984), and some studies of fear in early childhood suggest no sex differences (e.g., Bronson, 1970; Kochanska, 1991).

With regard to differences between measure types, correlations of parent-reported and laboratory-observed fear for male and female infants demonstrated a significant relationship between measures for females, but not for males. Although the difference between the magnitudes of these correlations was determined to be nonsignificant, this result does suggest the possibility that parent-reports of 12-month infant fear may be more consistent with laboratory observations of fear for females than males. If this is the case, previous research that has demonstrated higher parent-reported fear for females than males may be interpreted to mean that parents underestimate fear in male infants, rather than overestimating fear in female infants. However, these data could also suggest that female infants are more consistent than male infants in the ways in which they exhibit fearfulness across settings. This possibility would indicate that single measures of fear levels may be more reliable for female infants than male infants. Although the present study was unable to confirm the possibility that parent-reports were meaningfully more consistent with laboratory-observations of infant fear for females than males, this is an interesting question for future research.

Finally, the hierarchical multiple regression to determine the predictive abilities of child sex, parent-reported 12-month fear, laboratory-observed 12-month fear, and the interactions of child sex and each of these fear measures for internalizing problems at toddler age did not render any significant predictors. Based upon the current literature review, the predictive abilities of these measures of early fear have not been examined in this way before, so it is unclear whether or not this is a meaningful result or if factors such as sample size may have limited the ability of this analysis to find meaningful predictive relationships.
Limitations

The current study has some limitations that should be considered when interpreting its results and planning future related research. The first potential limitation is related to the representativeness of the sample. Specifically, the sample was relatively homogeneous with regard to participant race/ethnicity and parent marital status, with the vast majority of participants being the infants of married, Caucasian mothers. Although our recruitment strategy resulted in samples considered to be generally representative of the populations within the geographic areas wherein the data were collected, the same conclusion cannot be drawn for other areas of the United States or other countries.

In addition, the present study did not include an observation-based measure of fear at toddler-age follow-up. Data from an observation-based measure would have allowed a toddler-age sex comparison based upon observation, in addition to that based upon parent-report. This would have been interesting to determine if observation-based data collected from the present sample would be consistent with the parent-report data (i.e., demonstrating females to be more fearful than males), or if it would be consistent with the majority of previous observation-based studies of early fear, which have generally demonstrated no significant sex differences (e.g., Bronson, 1970; Skarin, 1977; Kochanska, 1991).

Another potential limitation of the current study involves the sole inclusion of parent-report data from mothers of participants. Although some father data were collected, there was considerably less father involvement, thus maternal data only were utilized in the analyses. Although the strategy used for the present study provides more specific information about mother-reports of child fear, it excludes any conclusions from being drawn with regard to father-
reports of child fear and the consistency of father-reports with laboratory-observations of early fear levels.

One limitation that was important to consider in the present study is that of multicollinearity. During data analyses, it was thought to be important to manage potential problems related to multicollinearity due to the potential for highly correlating independent variables within the hierarchical multiple regression. Centering of the independent variables was utilized to minimize these effects. Multicollinearity was not considered to be a problem in the current study because the Variance Inflation Factors (VIF) for all predictors were below 1.16.

The most likely limitation to have impacted the results of the present study was the relatively small sample size and its associated statistical power. As indicated by the above literature review, early sex differences, when found, have generally been found within larger samples. Although the sample size utilized for the first portion of the current study (n = 112) was larger than those that demonstrated no sex differences in the literature review, it is still a relatively small sample. This may have impacted the results of the analyses which served to compare the magnitudes of the correlations between parent-reported and laboratory-observed fear in female versus male infants. Specifically, the interval of the differences between the correlations for males and females was considerably large, which was likely partially due to a relatively small sample size, because confidence intervals tend to become smaller as sample sizes increase. This large interval, which included zero, precluded the determination of a significant difference between the magnitudes of the correlations, although a difference in magnitude was revealed as a possibility. In addition, it is possible that the smaller sample size that was utilized for the regression portion of the current study undermined the power of the regression to the
extent that small to moderate effect sizes, if they existed, would have been unlikely to be detected.

**Future Directions**

The current study provides several implications for future research. First, although the results of the study do not support a moderating effect of fear measure type for the relationship between child sex and internalizing problems, this possibility should not be ruled out by future research and should be addressed using a larger sample size to provide greater statistical power.

In addition, future research could include parent-reported levels of fear for both mothers and fathers. It may be important to consider consistency between parent-reported and laboratory-observed fear levels for mothers and fathers separately, comparing the two to determine if one group of caregivers reports data more consistently with laboratory observations than the other.

In addition, future research examining the predictive abilities of parent-reported and laboratory-observed fear in infancy could benefit from additional time points for follow-up data collection. At later follow-up points, variables such as anxiety symptoms and depressive symptoms in adolescence and early adulthood could be included to determine longer-term relationships between early measures of temperament and later clinical outcomes. This would be interesting with regard to clinical implications and would also provide another way to measure the predictive abilities of parent-reports and laboratory observations of early fear for later outcomes, which could be based upon self-report. This data would also provide additional information with regard to developmental trajectories of fear for males and females.
Finally, it would be interesting to include observation-based temperament measures of fear at later time points in order to determine whether or not sex differences emerge similarly to, or discrepantly from, parent-reported, and possibly self-reported, fear measures at later ages.

Summary

In summary, the results of the present study are consistent with previous research in that male and female infants demonstrated no significant differences in fear levels as measured by parent-report and laboratory-observation, and with regard to a significant sex difference in fear being found at toddler age. In addition, parent-reported fear levels were significantly correlated with laboratory-observed fear for female infants; whereas, this correlation for male infants was nonsignificant. Although the difference between the magnitudes of these correlations was not found to be statistically significant, this finding may be indicative of more accurate maternal-reports of fear for female infants than for male infants. A larger sample would be required to determine whether or not this is a meaningful difference, which, if found, would indicate that mothers may actually underestimate early fear levels in males, as opposed to overestimating them in females. Alternatively, this result could suggest a higher level of consistency of fear behaviors across settings for female over male infants. Finally, the data from the current study does not support a moderating effect of measure type for the relationship between child sex and internalizing at toddler age. Failure to find this effect may have been due to the relatively small sample size utilized in the present study, and the question of a moderating effect of measure type may be more effectively studied in the future by using a larger sample.

The fields of infant and child psychology would benefit from continued study of this question regarding the relative abilities of parent-reported versus laboratory-observed fear levels in male and female infants to predict later internalizing difficulties, such as anxiety and
depression. Specifically, a greater understanding of these predictive abilities would serve to provide additional information about early sex differences and risk and resiliency factors for internalizing disorders, and would offer a greater understanding of the most effective ways to assess for such factors. This information may provide future clinicians with earlier means for intervention to help parents prevent internalizing problems in their children by providing an early marker of risk.
References


exclusive maternal attention: Is it jealousy? *Infancy, 6*, 57-78.


Stanford University Press.


APPENDIX
Table 1. T-tests Comparing Participants Who Completed Both Measures Included in the 12-Month Assessment to Those Who Did Not

<table>
<thead>
<tr>
<th>Measure</th>
<th>Incomplete 12-Month Data</th>
<th>Complete 12-Month Data</th>
<th>t-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>N</td>
</tr>
<tr>
<td>Family SES</td>
<td>38.841</td>
<td>26.92</td>
<td>41</td>
</tr>
<tr>
<td>Child Sex</td>
<td>1.529</td>
<td>.504</td>
<td>51</td>
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<tr>
<td>IBQ-R (4m)</td>
<td>2.076</td>
<td>.750</td>
<td>49</td>
</tr>
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*Two-tailed test. IBQ-R (4m) Is IBQ-R Fear at 4 Months.
Table 2. T-tests Comparing Participants Who Completed Both the 12-Month Measures and the Follow-up Measures to Those Who Did Not

<table>
<thead>
<tr>
<th>Measure</th>
<th>Incomplete Data</th>
<th>Complete Data</th>
<th>t-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>N</td>
</tr>
<tr>
<td>Family SES</td>
<td>38.060</td>
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<td>Child Sex</td>
<td>1.486</td>
<td>.503</td>
<td>70</td>
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<tr>
<td>IBQ-R (4m)</td>
<td>2.070</td>
<td>.772</td>
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*Two-tailed test. IBQ-R (4m) Is IBQ-R Fear at 4 Months.
Table 3. T-tests Comparing Fear Levels for Male and Female Infants for Both 12-Month Measures of Fear

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
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<th>Females</th>
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<th>t-test</th>
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<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>N</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>IBQ-R Fear</td>
<td>2.932</td>
<td>.906</td>
<td>66</td>
<td>3.065</td>
<td>.948</td>
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<tr>
<td>Lab Fear</td>
<td>.350</td>
<td>3.408</td>
<td>58</td>
<td>-.235</td>
<td>3.437</td>
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</table>

*Two-tailed test.
Table 4. T-test Comparing Fear Levels of Males and Females at Toddler Age

<table>
<thead>
<tr>
<th>Measure</th>
<th>Male Toddlers</th>
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<th>Female Toddlers</th>
<th></th>
<th></th>
<th>t-Test</th>
<th></th>
<th></th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>ECBQ Fear</td>
<td>2.173</td>
<td>.558</td>
<td>46</td>
<td>2.458</td>
<td>.829</td>
<td>39</td>
<td>-1.885*</td>
<td>.063</td>
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*One-tailed test ($p \leq .10$).
Table 5. Regression Analysis for Predicting Internalizing Behaviors at Toddler Age, as Assessed by the CBCL/1.5-5

<table>
<thead>
<tr>
<th>Step &amp; Independent Variable</th>
<th>R</th>
<th>R²</th>
<th>∆R²</th>
<th>F</th>
<th>F∆</th>
<th>β</th>
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<tr>
<td>Step 1</td>
<td>.420</td>
<td>.176</td>
<td></td>
<td>15.178**</td>
<td></td>
<td>.420**</td>
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<tr>
<td>ECBQ Fear</td>
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<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.434</td>
<td>.189</td>
<td>.013</td>
<td>8.145**</td>
<td>1.092</td>
<td>.114</td>
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<tr>
<td>Child Sex</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Step 3</td>
<td>.446</td>
<td>.198</td>
<td>.010</td>
<td>4.210**</td>
<td>.411</td>
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<tr>
<td>IBQ-R (12m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.083</td>
</tr>
<tr>
<td>Lab Fear (12m)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>-.074</td>
</tr>
<tr>
<td>Step 4</td>
<td>.450</td>
<td>.203</td>
<td>.004</td>
<td>3.407**</td>
<td>.355</td>
<td></td>
</tr>
<tr>
<td>Child Sex X IBQ-R Fear (12m) Interaction</td>
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<td></td>
<td></td>
<td></td>
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<td>-.065</td>
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<tr>
<td>Step 5</td>
<td>.451</td>
<td>.203</td>
<td>.000</td>
<td>2.801*</td>
<td>.022</td>
<td>.018</td>
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<tr>
<td>Child Sex X Lab Fear (12m) Interaction</td>
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*p ≤ .05; ** p ≤ .01. IBQ-R (12m) Is IBQ-R Fear at 12 Months. Lab Fear (12m) Is Lab Fear at 12 Months.