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Attachment, Behavioral Inhibition, and Anxiety in Preschool Children

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This study examined the association between insecure attachment, behavioral inhibition, and anxiety in an at risk sample of preschool children. The relationship between maternal anxiety and child anxiety was also assessed. Participants were 104 children aged 3–4 years who were assessed for behavioral inhibition and mother–child attachment (using the Strange Situation procedure). DSM-IV criteria were used to assess childhood anxiety disorders. Insecure attachment and behavioral inhibition were both independently associated with child anxiety, even after controlling for the effect of maternal anxiety. Maternal anxiety was also associated with child anxiety. This study identified both constitutional and environmental factors associated with the expression of anxiety in young children. Furthermore, the highest levels of anxiety were shown by children who were behaviorally inhibited and insecurely attached and whose mothers were also anxious.

KEY WORDS: mother–child attachment; behavioral inhibition; childhood anxiety.

Kagan and colleagues (Kagan, Reznick, & Snidman, 1987) have described a temperament construct termed "behavioral inhibition to the unfamiliar" (BI), which is characterized by the predisposition to be irritable as an infant, unusually shy and fearful as a toddler, and quiet, cautious, and withdrawn in the preschool and early school age years, with marked behavioral restraint and physiological arousal in unfamiliar situations. The opposite temperamental construct has been termed "behaviorally uninhibited" (BUI), and is characterized by a bold, extroverted, sociable, and fearless approach to novel situations, objects, and people. Behavioral inhibition has been widely studied over the past 20 years and has been proposed as a risk factor for anxiety disorders in childhood (Rosenbaum et al., 1991, 1992). However, there are marked differences in the outcomes of inhibited children. Not all behaviorally inhibited children remain inhibited over the early childhood years (Reznick et al., 1986), and of those children who do remain inhibited (i.e., stably inhibited), not all develop anxiety disorders (Biederman et al., 1990), implicating other factors as important in the development of anxiety in childhood. Integrated models propose that environmental factors, such as parent–child attachment, may combine with temperament to increase the risk for the development of childhood anxiety (Manassis & Bradley, 1994; Mills & Rubin, 1993). However, only two empirical attempts have been made to examine both behavioral inhibition and attachment influences on childhood anxiety (Manassis, Bradley, Goldberg, Hood, & Swinson, 1995; Warren, Huston, Egeland, & Sroufe, 1997). Hence, the major aim of this study was to contribute to this literature by examining the relationships between insecure attachment, behavioral inhibition, and child anxiety in an at-risk sample of preschool-aged children.

Behavioral Inhibition and Anxiety

Numerous studies have found that behaviorally inhibited children have increased risk for multiple anxiety and phobic disorders (Biederman et al., 1990; Kagan, Snidman, Zentner, & Peterson, 1999; Rosenbaum et al., 1988), with the association being largely accounted for by children who remain inhibited over time. Using Kagan's longitudinal sample and the original classification system of behavioral inhibition, Hirshfeld and colleagues (1992) found that those children who remained inhibited

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across four assessments occurring between 21 months and 7.5 years of age had the highest risk for anxiety disorders relative to children who were not persistently inhibited. Prior, Smart, Sanson, and Oberklaid (2000) reported similar results with an Australian sample, using questionnaire ratings of shy temperament. Turner, Beidel, and Wolff (1996) concluded, in their review of studies of behaviorally inhibited children, that the most extremely inhibited children in these studies (approximately 10% of those studied) were the most likely to remain inhibited throughout middle childhood and also to be at the highest risk for developing anxiety disorders.

Kagan and his associates have argued that behavioral inhibition is best examined at its extremes and reflects a categorical rather than continuous dimension of infant temperament (Kagan, Reznick, & Gibbons, 1989). Indeed, in Kagan's research the stability and prediction of inhibition from infancy to early childhood was only evident when extreme groups were considered. Although the majority of temperamental traits are regarded as continuous variables, most agree that it is the individuals at the extremes of the distribution who are most vulnerable (Rothbart & Bates, 1998). As the bulk of the research on the relationship between behavioral inhibition and anxiety disorders has used Kagan's conceptualization of behavioral inhibition (Turner et al., 1996), we followed the Harvard group categorical classification and compared inhibited children with their uninhibited counterparts.

In summary, the research findings taken together indicate that behavioral inhibition represents a proneness to anxiety, placing the child at an increased risk for developing an anxiety disorder. However, behavioral inhibition can be considered neither necessary nor sufficient for the development of anxiety. Family relationship factors, such as parent–child attachment, may increase the likelihood of the transformation from a temperamental proneness to an anxiety disorder.

Attachment and Anxiety

Attachment theorists argue that the development of anxiety may be linked to insecure attachment (Bowlby, 1973; Sroufe & Waters, 1977). From an attachment theory perspective, each infant, however treated, will become attached to its caregiver by the end of the first year. However, individual differences in the secure versus insecure quality of attachments have been observed, resulting from differences in the caregiver's availability and responsiveness to the infant and the degree of reciprocity between the infant and the caregiver (Carlson & Sroufe, 1995). After observing infant–mother interactions in the home every 3 weeks for over a year, Ainsworth and colleagues (Ainsworth, Blehar, Waters, & Wall, 1978; Ainsworth & Wittig, 1969) devised an experimental procedure (the "Strange Situation") to assess differences in quality of attachment that involved two brief separations and reunions between parents and their 12-month-old infants in a laboratory environment. Although separation from an attachment figure in unfamiliar circumstances produces physiological arousal in all infants, they vary in their responses to their caregivers in the face of this arousal. Ainsworth and her collaborators (1978) discovered three types of attachment patterns based on infant behavior displayed in the Strange Situation: secure, insecure-avoidant, and insecure-ambivalent. These patterns of attachment related to the early care the infants had received at home.

Infants classified as secure with their caregiver (B classification) were able to use the caregiver as a secure base for exploration in the unfamiliar situation. They were distressed when separated from their mother but were readily comforted by her on reunion, and eventually returned to play. Secure infant behavior is based on the experience of well-coordinated, sensitive interactions with a mother who is consistently available and appropriately responsive to her infant's needs (Ainsworth et al., 1978). The mother helps the infant to achieve a sense of mastery over threatening or frightening situations and to manage distressed feelings in a well-modulated and effective way (Cassidy, 1994).

Infants classified as insecure-avoidant (A classification) tended to show minimal distress on separation and avoided their mother on reunion. Mothers of these infants were found to express an aversion to physical contact when their infants were upset, frequently rejecting their infants when they sought comfort and reassurance (Ainsworth et al., 1978). These infants tended to minimise or suppress expressions of negative affect (Cassidy & Kobak, 1988) and avoided their mother on reunion, presumably as a defense against painful feelings in relation to their mother's unavailability.

Infants classified as insecure-ambivalent (C classification) were noticeably unable to use the caregiver as a secure base for exploration, tending to seek proximity and contact with the caregiver even prior to the separation. These infants became overtly distressed upon separation, and showed angry, resistant, and ambivalent behavior upon reunion with their mother, displaying proximity-seeking behavior but then resisting contact angrily once it was achieved. Mothers of insecure-ambivalent infants were found to be the most inconsistent in their availability and least competent in comforting their infants, and directly interfered with their infant's exploration (Cassidy & Berlin, 1994).

A fourth group of insecure disorganized/disoriented (D classification) infants was later identified (Main & Solomon, 1986). These infants exhibited unusual, conflicted behaviors, such as behavioral stilling, stereotyped movements, or direct apprehension with regard to the parent that indicated an inability to maintain one coherent pattern of attachment behavior in the face of distress. Mothers of disorganized infants have been described as either frightening to the child or frightened themselves, due to the experience of personal trauma or loss (Main & Hesse, 1990). Hence, for these infants, the caregiver serves as a source of both fear and reassurance, which understandably leads to conflicted behavior in their infants.

Conceptually similar patterns of A, B, and C attachment have subsequently been identified in preschool-aged children (Cassidy & Marvin, 1992) in a comparable separation and reunion context. The major change in attachment behavior in the preschool age group is the child's greater reliance on verbal communication rather than physical contact for expressing attachment needs, for negotiating issues like separation from the mother, and for re-establishing the relationship following the mother's return. In addition, while some insecure disorganized/disoriented children continue to demonstrate a lack of a coherent attachment strategy at preschool age, other children show a new profile of controlling behavior. This new insecure pattern involves the child taking some control of the mother–child relationship in either a caregiving or punitive way when the mother herself fails to take appropriate responsibility in the caregiving role.

According to Bowlby, anxiety originates in an infant's uncertainty about caregiver availability, which is the fundamental condition underlying insecure attachment. It has been suggested that the type of insecurity that is most likely to be associated with later anxiety disorders is the insecure-ambivalent classification (Cassidy & Berlin, 1994). As a consequence of the unpredictable and inconsistent availability of their caregiver, children with insecure-ambivalent attachments are chronically anxious, worrying about whether their needs will be met (Warren et al., 1997), and constantly fearful of being left vulnerable and alone. These children are characterized by heightened monitoring of their mother and inhibited exploratory behavior. Fearfulness may result from limited familiarity with the environment. In frightening situations, they show an exaggerated fear response, constituting overt anxiety (Manassis, 2001).

Bradley (2000) has argued that insecure-avoidant attachment may also lead to anxiety disorders. As mentioned earlier, mothers of avoidant children are consistently rejecting, particularly in times of distress, and respond preferentially to positive emotions, resulting in their children learning to mask negative affect in order to ensure receiving care when distressed (Goldberg, MacKay-Soroka, & Rochester, 1994). Cassidy and Kobak (1988) described studies showing that avoidant individuals suppress negative affect (particularly anxiety and anger), dismiss the importance of relationships (appearing to be highly self-reliant), use idealizing defences, and are rated as more hostile than securely attached individuals. Dadds, Rosental Gaffney, Kenardy, Oei, and Evans (1993), in a survey of anger expression in anxious individuals, confirmed the difficulty individuals with anxiety disorders have with internalized hostility.

Theoretical Models: Behavioral Inhibition, Attachment, and Anxiety

Manassis and Bradley (1994) have proposed an integrated model, in which insecure attachment and inhibited temperament both contribute individually to the development of anxiety disorders, while the interaction between them is thought to play the greatest role. They suggest that "an infant whose temperament is characterized by high sympathetic arousal may be more vulnerable to both behavioral inhibition and insecure attachment, especially if the infant's primary caregiver is anxious" (p. 355). Studies have shown that parents of behaviorally inhibited children are more likely to be anxious themselves (Rosenbaum et al., 1991, 1992). Furthermore, mothers with anxiety disorders have been found to have high rates of insecure attachment relationships with their children (Manassis et al., 1995). It is assumed that both insecurity of attachment and vulnerability to sympathetic arousal generate an increased likelihood of disruption in the smooth development of affect regulation, which forms the basis for subsequent anxiety disorders. Similar integrated models of the development of anxiety/internalizing problems have been proposed by Rubin and his colleagues (e.g., Mills & Rubin, 1993), and Rapee (2001).

Only a few attempts have been made to examine how both behavioral inhibition and attachment might contribute to the occurrence of childhood anxiety disorders. Manassis and colleagues (1995) were the first to examine cross-sectional relationships between behavioral inhibition, attachment, and anxiety symptoms, using a clinical sample of preschool-aged children of anxious mothers. Behavioral inhibition was associated with more somatic problems, while insecure attachment was associated with higher internalizing problems and evidence of childhood anxiety. However, due to the small sample size, an interaction effect could not be tested, nor was the effect of each

factor controlled in the analyses. Hence the independent effects of behavioral inhibition and attachment could not be ascertained.

A study by Warren and colleagues (1997) focused on the link between anxiety and specific types of insecure attachment in a high-risk sample. They conducted a longitudinal follow-up of 172 adolescents who had participated in assessments of mother–infant attachment when they were 12 months of age. Fifteen percent of the adolescents ($n = 26$) met criteria for at least one anxiety disorder. The authors found that insecure-ambivalent attachment assessed in infancy predicted anxiety disorders at age 17 years, above and beyond maternal anxiety and infant temperament (assessed by maternal report). Infant temperament was also associated with later anxiety. No relation was found between maternal anxiety and child/adolescent anxiety disorders. Moss and colleagues (Moss, Bureau, Cyr, Mongeau, & St-Laurent, 2004; Moss, Rousseau, Parent, St-Laurent, & Saintonge, 1998) have also reported on subtypes of insecure attachment as related to teacher reports of internalizing and externalizing behaviors in a longitudinal study of children followed from 3 to 9 years of age. Internalizing and externalizing problems were most closely linked with the disorganized attachment group across all ages. In addition, Moss et al. (1998) reported elevated externalizing problems in insecure-ambivalent children at 5–7 years of age, and elevated internalizing problems in males with insecure-avoidant attachment in the same age range. The lack of association between insecure-ambivalent attachment and internalizing problems in this sample raises the possibility that the consequences of insecure ambivalent-attachment in infancy and at preschool age may not be the same.

The Current Study

This study examined the concurrent, independent associations between behavioral inhibition, attachment, and child anxiety in an at-risk sample of preschool-aged children, using currently validated observational measures of behavioral inhibition and attachment. Given the familial transmission of anxiety disorders, the association between maternal anxiety and child anxiety was also examined. We hypothesized that children who were both behaviorally inhibited and insecurely attached to their mother would display higher levels of anxiety than secure inhibited children or insecure uninhibited children. Behavioral inhibition and attachment status were assessed in different laboratory settings separated by at least 2 weeks to help ensure independence of measurement.

METHOD

Participants

Seventy-two behaviorally inhibited (29 boys, 43 girls) and 32 behaviorally uninhibited (21 boys, 11 girls) children and their mothers were recruited from a larger screened sample to participate in the study. This research was conducted as one component of a larger longitudinal study of the effect of an intervention program aimed at reducing behavioral inhibition (and presumably the risk for anxiety disorders) in a selected group of 3 to 4-year-old behaviorally inhibited children (Rapee, 2002). The current study was conducted prior to the assignment of children to the treatment program. The children ranged in age from 36 to 59 months ($M = 46.45$ months, $SD = 4.39$ months). Fifty-two percent of the children ($n = 54$) were first-born. Mothers' ages ranged from 26 to 45 years ($M = 35.41$ years, $SD = 4.03$ years). Fifty percent of the mothers ($n = 52$) did not work, 47.1% ($n = 49$) worked part-time, and 2.9% ($n = 3$) worked full-time. All participants were Caucasian except for four mothers and children who were of Asian background. Ninety-six percent of mothers were married ($n = 100$), three were divorced, and one was a widow. The highest level of education completed by the mothers varied broadly: 11.5% ($n = 12$) completed year 10; 11.5% ($n = 12$) completed high school; 26% ($n = 27$) had a professional diploma/certificate; and 51% ($n = 53$) had a university degree. Children in the inhibited and uninhibited groups did not differ on age, birth order, mother's age, mother's work status, mother's education, or parents' marital status ($p's > .05$). Chi-square analysis revealed that the groups differed on gender, with more girls in the behaviorally inhibited group, $\chi^2(1) = 5.7$, $p = .017$. Hence gender was used as a control variable in analyses involving comparisons of the inhibited and uninhibited groups.

Measures

Behavioral Inhibition Screening–Temperament Questionnaire

Mothers ($n = 1762$) completed the Short Temperament Scale for Children (STSC; Sanson, Smart, Prior, Oberklaid, & Pedlow, 1994) as the first stage of the behavioral inhibition screening process. This questionnaire is a modified form of the Childhood Temperament Questionnaire for 3 to 7-year olds (Thomas & Chess, 1977), with normative factor scores derived from a large

scale Australian study ($n = 2443$) (Sanson, Prior, Garino, Oberklaid, & Sewell, 1987). The STSC comprises 30 items designed to assess four temperament dimensions: Approach (the tendency to approach versus withdraw from novel situations and people), Inflexibility, Persistence, and Rhythmicity. Items are rated on a 6-point scale indicating the extent to which they are characteristic of the child, from 1 = *almost never* to 6 = *almost always*. The STSC has been found to have adequate internal consistency, response range, and independence of dimensions, and adequate reliability (Cronbach alphas = .70–.84) (D. Smart, personal communication). The Approach factor is considered to index shyness versus sociability (Sanson et al., 1994). For the purposes of this research, children who scored ≥ one standard deviation above ($n = 285$) or below ($n = 184$) the mean of the seven items comprising the Approach factor were considered to meet criterion for behavioral inhibition or uninhibition, respectively, on this measure. Internal consistency for the Approach factor in the current study was .94 (Cronbach alpha).

Behavioral Inhibition Screening – Laboratory Assessment

Behavioral inhibition was assessed using a laboratory procedure adapted from Kagan et al. (1989) for 4-year olds. Children were classified as behaviorally inhibited or uninhibited based on their responses to a range of unfamiliar settings and new people, including: exposing the child to a new room full of strange-looking objects, introduction to an experimenter, introduction to a stranger wearing a mask and a white lab coat, 30-min separation from mother while the child was administered cognitively challenging tasks, and a 15-min period of play with a same-sex peer. Behavioral inhibition was defined by criteria previously established by Kagan. These included (1) time spent proximal to mother (more than 1 min), (2) amount of time staring at the stranger or peer (more than 2 min), (3) limited speech (less than 1 min), (4) number of times approaching the stranger in the lab assessment (2 times or less), and (5) number of times approaching the peer (one time or less). Children who showed three or more out of the five inhibited behaviors over the course of the laboratory assessment were classified as behaviorally inhibited ($n = 72$). Children who showed three or more uninhibited behaviors (reversed inhibited behaviors, i.e., time spent proximal to mother (less than 1 min)); amount of time spent looking at stranger or peer (less than 2 min); speech (more than 1 min); approaching the stranger (more than twice during the procedure), and approaching the peer (more than once) were classified as behaviorally uninhibited ($n = 32$). Inter-rater reliability for coding the five inhibited/uninhibited behaviors was determined by having two trained coders independently score the videotapes for 84 children who were participants in this study and/or in the concurrent longitudinal study. Reliability coefficients computed for each of the five behaviors ranged from Kappa = .76–1.00, with a median of .98.

Attachment

Child–mother attachment was assessed using the preschool version of the Strange Situation procedure (Cassidy & Marvin, 1992). Similar to the infant version of the Strange Situation procedure (Ainsworth et al., 1978), it consists of eight episodes, including two brief (3-min) separations and reunions with the mother. Given the behaviorally anxious status of many of the children, we followed the currently recommended procedure of including a strange female rather than leaving the child alone during two separations as is sometimes done (R. Marvin, personal communication, 2001). The assessment was conducted in a laboratory playroom that included two chairs (one for the mother and one for the stranger), and a range of age-appropriate symbolic (e.g., tea set) and construction (e.g., puzzles, Lego) toys. Mothers were told that this part of the study examined children's responses to brief separations from their mother. During the time in the playroom they were instructed to respond naturally to their child's overtures, but were asked to remain in their chair when possible. With respect to leave-taking, mothers were told to leave the room however they liked, while making sure their child remained in the room. Mothers were reassured that if their child became distressed upon separation, they could return to the room immediately if they wished. Once the mother left the playroom, she entered the videotaping room, where she observed her child through a one-way mirror. The role of the stranger was to be available and responsive to the child as needed after the mother left the room, but otherwise to remain seated in her chair.

Cassidy, Marvin, and the MacArthur Working Group modified the infant assessment criteria to accommodate the older age of the children (2.5–4.5 years of age). For example, the timing and quality of distance interaction (including talking) is used as an index of security instead of the proximity seeking and contact maintenance of infants/toddlers. They also emphasized the importance of considering additional aspects of parent–child interaction, such as the quality of parent–child negotiations around departures and reunions, as an index of the quality of the goal-corrected partnership, which starts to emerge in the older toddler period (Bowlby, 1969/1982). Based on ratings of reunion behavior and patterns of

child behavior throughout the procedure, child–mother dyads are classified into one of five categories, that is, secure (B), or one of four insecure categories, including insecure-avoidant (A), insecure-ambivalent (C), insecure-controlling/disorganized (D), or insecure-other (IO). The core characteristics of each attachment category are as follows:

1. *Secure (B) children* use the parent as a secure base from which to explore the novel social and physical environment. There may be some protest on separation, however, the dyad is able to negotiate the separation constructively. Reunion behavior is smooth, open, warm, and positive, after which the child returns to play.
2. *Avoidant (A) children* become engaged in exploration, but with little affective interaction with the parent. They display little or no wariness of the stranger, and are highly unlikely to show distress on separation. Immediately upon reunion, these children tend to actively avert gaze, avoid or ignore the parent, continuing their play. They fail to actively initiate interaction with the parent but may be somewhat responsive to her attempts at interaction. Exploration is compromised in reunions despite the lack of overt distress. The avoidant child's goal is not to avoid interaction altogether, but to maintain neutrality, avoiding physical or psychological intimacy.
3. *Ambivalent (C) children* show poor exploration and play and are wary of the stranger and novel situations. They tend to seek contact with the caregiver or cry on separation, and the dyad cannot reach a comfortable negotiated agreement about the separation. Reunion behavior is characterized by strong proximity seeking and babyish, coy behavior, together with either anger, or active resistance to contact, or prolonged fussiness or crying in a passive way. These children attempt to seek comfort from the parent, but are unable to derive such comfort. Essentially they are unable to use the parent as a secure base. The ambivalent child's goal is to emphasize his/her dependence on the parent in an attempt to gain the parent's attention.
4. *Controlling (D) children* exhibit controlling behavior (punitive or caregiving) toward the parent during the reunion, in an attempt to reduce uncertainty/unpredictability through taking charge of the interaction themselves. Behaviors associated with infant disorganization may also be present on reunion, for example, simultaneous but contradictory sequences of behavior (e.g., approaching the mother with gaze strongly averted), incomplete, interrupted movements (including stereotypies), direct indications of confusion and fear/apprehension, dazed and disoriented expressions, and indices of depressed affect (Main & Solomon, 1986).
5. *Insecure-other (IO) children* display a mixture of insecure behaviors that do not fit any of the three identified insecure patterns, or that represent a combination of the identified insecure patterns, for example, A and C.

For purposes of data analysis, children classified as insecure-other are combined with children classified as insecure-controlling to form a single D group. When children are classified as insecure-controlling or insecure-other, the underlying (or "forced") A, B, or C classification is also assigned. Although these children very seldom meet the criteria for placement in any single A, B, or C category, a best fitting alternative secure, avoidant, or ambivalent category can usually be assigned, as is done with infants and 6-year olds (Cassidy & Marvin, 1992; Main & Cassidy, 1988).

The procedure was videotaped from behind a one-way mirror for subsequent scoring. All videotapes were rated by the first author, who was blind to the child's behavioral inhibition status and anxiety diagnoses. Reliability was established by having the second author, who was also blind to the child's behavioral inhibition status and anxiety diagnoses, independently rate 20 videotapes. Both authors are certified coders of the Cassidy-Marvin (MacArthur) Preschool Attachment Classification System (Cassidy & Marvin, 1992). Percentage agreement was 90% (Cohen's Kappa = .79) for major A-B-C-D classification.

Child Anxiety

DSM-IV criteria were used to assess anxiety diagnoses. Mothers were interviewed using the Anxiety Disorders Interview Schedule for Children, Parent version (ADIS-CP-IV) (Silverman & Albano, 1996), a structured interview based on diagnostic criteria from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) (American Psychiatric Association, 1994). The ADIS-CP-IV assesses the presence of anxiety disorders, as well as several other Axis 1 diagnoses, including Attention Deficit/Hyperactivity Disorder (ADHD)-Inattentive Type, ADHD-Hyperactive Type, ADHD-Combined Type, Oppositional Defiant Disorder (ODD), Selective Mutism, and Sleep Terror Disorder. The following anxiety disorders were assessed: Separation

Anxiety Disorder (SAD), Social Phobia, Specific Phobia, Generalized Anxiety Disorder (GAD), Obsessive-Compulsive Disorder (OCD), and Posttraumatic Stress Disorder (PTSD). The ADIS-CP-IV interviews were administered and scored by two trained clinical psychologists. Reliability was established by having the two coders score 84 interviews from mothers participating in this study and/or the concurrent longitudinal study, and was found to be adequate (Cohen's Kappa: SAD = 0.79, Social Phobia = 0.84, Specific Phobia = 0.69, and GAD = 0.54). Due to the young age of the children, questions that were not age-appropriate were excluded from the interview.

Maternal Trait Anxiety

Mothers completed the Trait version of the State-Trait Anxiety Inventory, Form Y (STAI-T; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), a frequently used self-report measure of adult trait anxiety. The STAI-T consists of 20 items that require individuals to rate how they generally feel on a 4-point scale from 1 = *almost never* to 4 = *almost always*. The STAI has demonstrated adequate construct validity and internal consistency (Spielberger et al., 1983). Internal consistency for the Trait version of the STAI in the current study was .93 (Cronbach alpha).

Procedure

A two-stage screening process was used to identify behaviorally inhibited and uninhibited children who would be eligible for the larger study. The first stage involved contacting mothers through local preschool programs and day care centres and asking them to complete the STSC ($n = 1762$). Children who met the cut-off criteria, or in other words those who looked as if they would be either inhibited ($n = 285$) or uninhibited ($n = 184$) based on the temperament questionnaire, were invited to attend the second screening stage, which involved a laboratory observational assessment to confirm their inhibited or uninhibited status. Only consenting mothers whose children also met criteria for behavioral inhibition or uninhibition on both the questionnaire and laboratory assessments were included in the larger longitudinal study (inhibited, $n = 152$; uninhibited, $n = 45$). During the laboratory assessment, mothers also completed an interview and questionnaires about their children's anxiety symptoms and behavior problems, and returned a demographic questionnaire that they had received earlier by mail. Following the laboratory assessment, mothers of children who met criteria were invited to return with their child approximately 2 weeks later to a different laboratory setting for the assessments to be reported here, which included the Strange Situation procedure, and a questionnaire assessment of maternal anxiety. Fifty-two percent of mothers agreed to participate in these additional assessments. A significantly higher proportion of mothers of uninhibited children agreed to take part in the additional part of the study than mothers of inhibited children, $\chi^2(1) = 7.85$, $p = .005$.

While participating mothers did not differ from mothers who declined to participate on a range of demographic variables, including child's age, birth order, mother's age, level of education, marital status, ethnicity, and work status (t test or chi-square statistics as appropriate, p's $> .05$), significant differences did emerge in children's overall anxiety, with those children who took part in the current study exhibiting fewer anxiety disorders than those whose mothers refused to participate, $t(174) = -2.01$, $p = .046$.

RESULTS

Child Anxiety

The following analyses were based on the 104 children whose mothers agreed to participate in the additional attachment and questionnaire assessments. Based on scores on the Anxiety Disorders Interview Schedule (ADIS-CP-IV), 67% of the children ($n = 70$) met criteria for at least one anxiety disorder, including either SAD, social phobia, specific phobia, OCD, or GAD. None of the children met criteria for PTSD. Twenty-seven percent of the children ($n = 28$) met criteria for only one anxiety disorder, 23% ($n = 24$) for two anxiety disorders, 13% ($n = 14$) for three anxiety disorders, and 4% ($n = 4$) for four anxiety disorders. Six children met the diagnostic criteria for ADHD-Inattentive Type, four for ADHD-Hyperactive Type, and four for ADHD-Combined Type. Six children met criteria for ODD, 26 for Selective Mutism, and four for Sleep Terror Disorder. While behaviorally inhibited and uninhibited children did not differ on overall number of nonanxiety psychiatric disorders, $t(39) = .124$, $p = .90$ (two-tailed), a significant difference was found between the secure and insecure groups, with insecure children displaying a higher number of nonanxiety disorders than their secure counterparts, $t(102) = 2.2$, $p = .03$ (two-tailed).

However, due to the difficulty associated with differentiating the individual anxiety disorders at this young age, and to the low frequency of children meeting criteria for some of the individual anxiety disorders, a decision was made to use an overall measure of anxiety rather than to conduct analyses using the specific anxiety disorder

data. This overall measure of anxiety was the sum of the number of anxiety disorders for which a child met the diagnostic criteria ($M = 1.29$, $SD = 1.17$, range = 0–4). There was no difference between boys ($M = 1.14$, $SD = 1.20$) and girls ($M = 1.43$, $SD = 1.14$) on this measure, $t(102) = -1.25$, $p = .22$. This index of anxiety was chosen over a simpler symptom count measure, as the latter could not be reliably derived from the ADIS since symptom questions were skipped for diagnoses where the child failed to pass initial screening questions.

Attachment and Behavioral Inhibition

Chi-square analyses were used to determine whether the proportion of children classified as secure versus insecure differed in the behaviorally inhibited and uninhibited groups. In order to compare the groups first on the basis of overall security of attachment, major attachment classifications were collapsed to form two categories: secure (B) and insecure (A, C, D combined). When the groups were compared on overall security of attachment, there was no significant difference between the proportion of children with secure or insecure attachments in the behaviorally inhibited and uninhibited groups, $\chi^2(1) = 2.46$, $p > .05$, and the percentages were similar to those observed in unselected samples (see Table I). However, when the individual insecure subclassifications (A, C, and D) were included in the analysis, significantly more insecure children in the behaviorally inhibited group were classified as insecure-ambivalent (C) (20.8%) than in the uninhibited group (3.1%), Fisher Exact Test $\chi^2(3) = 8.96$, $p = .02$. When children judged insecure-controlling or insecure-other were assigned their best alternate A-B-C classification, all five children were assigned to the insecure-avoidant group.

Boys and girls did not differ on attachment security, $\chi^2(1) = 1.96$, $p = .16$, or attachment subgroup classification, $\chi^2(3) = 2.61$, $p = .46$.

Attachment, Behavioral Inhibition, and Maternal Anxiety

A 2 (behavioral inhibition vs. behavioral uninhibition) × 2 (secure vs. insecure attachment) ANOVA was conducted, with gender as a control variable, and maternal trait anxiety as the dependent variable, in order to determine whether the behaviorally inhibited and uninhibited groups, and the secure and insecure groups differed on maternal trait anxiety. Table II presents descriptive data for the behavioral inhibition and attachment groups on maternal trait anxiety. Results showed no significant differences between the behaviorally inhibited and uninhibited groups, $F(1, 99) = 1.62$, $p = .20$, or the secure and insecure groups, $F(1, 99) = .00$, $p = .99$. Mothers of boys did not differ from mothers of girls on trait anxiety (boys: $M = 36.5$, $SD = 8.62$; girls: $M = 35.77$, $SD = 9.37$), $F(1, 99) = .48$, $p = .49$. No differences on maternal trait anxiety emerged between mothers of children in the various attachment subgroup classifications, $F(3, 99) = .27$, $p = .85$.

Attachment, Behavioral Inhibition, Maternal Anxiety, and Child Anxiety

The next analyses examined the relationships between behavioral inhibition, attachment, and child anxiety. Maternal anxiety, which was moderately correlated with child anxiety ($r = .34$, $p < .001$), was used as a control variable along with child gender in all analyses. Frequency data for child anxiety disorders by behavioral inhibition status and attachment classification are presented in Table III.

A 2 (behavioral inhibition vs. behavioral uninhibition) × 2 (secure vs. insecure attachment) ANOVA was conducted, with maternal trait anxiety and gender as control variables, and child anxiety as the dependent variable. Attachment was analyzed as a binary

Table I. Child Attachment: Frequency of Major A-B-C-D Patterns of Attachment in the Behaviorally Inhibited and Uninhibited Groups (Total $N = 104$)

	Behaviorally inhibited (BI)		Behaviorally uninhibited (BUI)		Total	
Attachment classification	%	(*n*)	%	(*n*)	%	(*n*)
Secure (B)	62.5	(45) [48.5]	78.1	(25) [21.5]	61.3	(70)
Insecure (A, C, D)	37.5	(27) [23.5]	21.9	(7) [10.5]	32.7	(34)
Insecure-avoidant (A)	9.7	(7) [9]	18.8	(6) [4]	12.5	(13)
Insecure-ambivalent (C)	20.8	(15) [11.1]	3.1	(1) [4.9]	15.4	(16)
Insecure-controlling/insecure-other (D)	6.9	(5) [3.5]	0	(0) [1.5]	4.8	(5)
Total	69.2	(72)	30.8	(32)	100	(104)

Note. () observed frequency. [] expected frequency.

Table II. Mean Maternal Trait Anxiety by Child BI Status and Attachment Group

BI status	Secure (B)	Insecure-avoidant (A)	Insecure-ambivalent (C)	Insecure-Controlling/ insecure other (D)	Overall insecure (A, C, D)	Total
BI						
M	36.45	43.29	35.22	35.60	37.38	36.80
SD	9.46	9.11	9.13	9.15	9.47	9.40
BUI						
M	35.33	31.83	32.00	—	31.86	34.55
SD	8.01	7.78	—	—	7.11	7.84
Total						
M	36.06	38.00	35.02	35.60	36.24	36.12
SD	8.94	10.10	8.86	9.15	9.22	8.98

(secure versus insecure) variable since small cell sizes precluded meaningful analysis using the four group A-B-C-D classification. Results showed that behavioral inhibition and insecure attachment were associated with child anxiety independently of maternal trait anxiety: behavioral inhibition, $F(1, 98) = 52.14$, $p = .000$; attachment, $F(1, 98) = 4.74$, $p = .032$. The control variable, maternal trait anxiety was also significant in the analysis, $F(1, 98) = 13.19$, $p = .000$. When an attachment $\times$ behavioral inhibition interaction effect was added to the analysis, it failed to reach significance, $F(1, 97) = 0.38$, $p = .54$.

DISCUSSION

Behavioral inhibition and insecure attachment were both found to be associated with child anxiety, even after controlling for the effect of each other and of maternal trait anxiety. As found in previous studies (Biederman et al., 1990; Hirshfeld et al., 1992; Rosenbaum et al., 1988), behaviorally inhibited children displayed higher levels of anxiety than their uninhibited counterparts. Similarly, insecure children demonstrated higher levels of anxiety than secure children, which is consistent with previous studies (Manassis et al., 1995; Warren et al., 1997) and supports Bowlby's (1973) explanation for anxiety as resulting from the child's uncertainty about the availability of the caregiver, which is the hallmark of insecure attachment relationships.

Maternal anxiety was also associated with child anxiety, further supporting the evidence for a familial transmission of anxiety (Beidel & Turner, 1997). However, as the measure of maternal anxiety used in this study may have reflected variance attributable to genetic factors, it remains unclear whether the link between maternal anxiety and child anxiety is due to genetic or environmental (i.e., parenting) influences. Previous studies have provided evidence supporting both genetic factors and shared environmental factors in the expression of childhood anxiety (Eley & Stevenson, 2000). Moreover, it has recently been argued that the Trait version of the State-Trait Anxiety Inventory assesses a number of symptoms, including depression and lack of confidence, which are not anxiety-specific, and that it can best be conceptualized as a measure of general negative affectivity/distress rather than of pure anxiety (Kennedy, Schwab, Morris, & Beldia, 2001). Within this context, our results could then be interpreted as supporting a link between children's anxiety and

Table III. Mean Number of Child Anxiety Disorders by BI Status and Attachment Group

BI status	Secure (B)	Insecure-avoidant (A)	Insecure-ambivalent (C)	Insecure-controlling/ insecure other (D)	Overall insecure (A, C, D)	Total
BI						
M	1.58	2.57	1.80	2.20	2.07	1.76
SD	1.03	1.27	0.94	0.84	1.04	1.06
BUI						
M	0.20	0	2.00	—	0.29	0.23
SD	0.50	0	—	—	0.76	0.56
Total						
M	1.10	1.38	1.81	2.20	1.71	1.30
SD	1.10	1.61	0.91	0.84	1.22	1.17

Note. Range of anxiety disorder scores = 0–4.

maternal negative affectivity more generally, rather than specifically maternal anxiety. Nonetheless, twin studies have shown that the genetic factor across the anxiety and mood disorders is a general vulnerability or propensity to neurosis (Andrews, 1996), an increased sensitivity to environmental stressors (Bradley, 2000), or the individual's basic level of arousal as well as his/her tendency toward emotional reactivity (Rapee, 2001). Hence, maternal general negative affectivity may still be an index of a familial pattern of anxiety.

Importantly, the finding that behavioral inhibition was associated with child anxiety even after controlling for the effect of maternal anxiety suggests that although behavioral inhibition may be linked to a familial predisposition to anxiety (Rosenbaum et al., 1991, 1992), it is likely to act as an additional risk factor. Similarly, the finding that insecure attachment still contributed to child anxiety over and above the contribution of maternal anxiety suggests that attachment does not merely reflect a shared genetic vulnerability toward anxiety between mother and child. Rather, maternal failure to provide a predictable, secure base for the child may further increase the risk for anxiety (Belsky, 1999).

While the results of this research provided clear support for the independent contribution of behavioral inhibition and insecure attachment to child anxiety, the integrated model's (Manassis & Bradley, 1994) prediction of an interactive relationship between these two factors was not supported. Instead, the extent to which behavioral inhibition and insecure attachment individually operated as risk factors was similar, regardless of whether both factors were present for an individual child or not. However, the small number of children we were able to identify as both behaviorally uninhibited and insecurely attached would have limited the statistical validity of any tests of interaction effects. Future research with larger samples may be able to provide a fairer test of the interaction hypothesis.

This research also provided some support for the concept that childhood anxiety may develop in the context of any of the insecure attachment classifications. Although this could not be tested statistically due to the small sample sizes in the insecure attachment subgroups, the mean number of anxiety symptoms was elevated across all the insecure subgroups compared to the mean number observed in the secure group. Furthermore and similar to Moss et al.'s (1998) findings regarding internalizing symptoms in 3- to 9-year olds, anxiety symptoms were highest in the insecure-disorganized and insecure-avoidant attachment groups. Thus parenting styles that give rise to avoidant, ambivalent, and disorganized attachment styles may foster similar outcomes in children, suggesting that it is the general insecurity in the mother–child relationship rather than the specific type of insecurity that is most important. For example, in the case of insecure-avoidant attachment, Manassis (2001) has proposed that the child feels rejected by the parent at times of distress, resulting in excessive self-reliance, and a decreased desire for social contact. Avoidance of social contact impairs the development of coping strategies for affective arousal in social situations and prevents the exposure to perceived threats, which, together with temperamental vulnerability to sympathetic arousal, increases the risk for anxiety, and especially for social phobia. The combination of excessive self-reliance, the avoidance of negative affect, and high levels of arousal may also produce defenses such as isolation of affect, undoing, and reaction formation, all characteristic of obsessive-compulsive disorder, or defensive disavowal of emotional distress, which may result in its physical expression as somatoform symptoms (Manassis & Bradley, 1994). Similarly, Goldberg (1997) proposed that avoidant children, who learn to repress their feelings and needs, appear most likely to display internalizing problems in which the child experiences pain and distress but rarely disturbs others (e.g., depression, anxiety, social withdrawal). Indeed, links between avoidant attachment and internalizing problems have been reported in other studies (e.g., Goldberg, Gotowiec, & Simmons, 1995). When an avoidant pattern of attachment, in which the child tries very hard to appear neutral and to hide his/her emotions, is combined with high levels of arousal (as in the case of behaviorally inhibited children), the risk for anxiety disorders is likely to increase even further.

The fact that 15 out of the 16 (94%) children classified as insecure-ambivalent came from the behaviorally inhibited group is consistent with the similarities reported between behaviorally inhibited and insecure-ambivalent children (Cassidy & Berlin, 1994). As Stevenson-Hinde (2000) has suggested, these similarities can be partly due to similarities in mothering style. Behavioral inhibition has been found to be associated with parental overprotection, overcontrol, and less allowance of psychological autonomy (Rapee, 1997; Siqueland, Kendall, & Steinberg, 1996). Such interactions are similar to those associated with the insecure-ambivalent pattern of attachment, which is characterized by parenting that is inconsistent and unpredictable but also intrusive and interfering (Cassidy & Berlin, 1994). An additional reason for the association between behavioral inhibition and ambivalent attachment may concern the manner in which insecure-ambivalent children express their emotions. Using a strategy of overemphasizing emotions and dependence, insecure-ambivalent children may exaggerate the expression of negative emotions and be observed to be the most fearful (Stevenson-Hinde, 2000). Finally, it can be argued that

an overlap in the behavioral definitions of these two constructs may explain the similarities, for example, clinging to mother when faced with unfamiliar people or novel objects, inhibited exploration, and withdrawal.

The relations between temperament and attachment have been debated for many years. It has been suggested that behaviorally inhibited children have difficulty dealing with brief separations from and subsequent reunions with their caregivers (Fox & Calkins, 1993). Some researchers have interpreted these reactions as reflecting dispositionally based wariness to the unfamiliar (Fox & Calkins, 1993), while others have argued they represent the behavioral manifestation of an insecure attachment relationship (Bretherton, 1985). Empirical support has been mixed. Several studies found no association between behavioral inhibition/fearful behavior and the classification of attachment security versus insecurity in the Strange Situation procedure (Nachmias, Gunner, Mangelsdorf, Parritz, & Buss, 1996), while others found an association with attachment classification, but only at the level of the subtype of insecurity displayed, and specifically with ambivalent classifications in the Strange Situation procedure (Belsky & Rovine, 1987). In the current investigation no significant differences were found between the proportion of securely attached children in the behaviorally inhibited and uninhibited groups. In other words, there was no increased risk of insecure attachment in the behaviorally inhibited children, indicating that temperament or behavioral inhibition does not appear to determine security or insecurity of attachment. However, there was a clear association between behavioral inhibition and insecure attachment subclassification. As mentioned above, significantly more insecure children were classified as insecure-ambivalent in the inhibited group than in the uninhibited group. Similarly, Stevenson-Hinde and Marshall (1999) found highest behavioral inhibition ratings in the insecure-ambivalent and insecure-other groups. Thus, behavioral inhibition does seem to influence the type of insecurity the child displays. These findings support the argument that temperament may be related to certain attachment behaviors or classifications, but not to attachment security (Belsky & Rovine, 1987). Nevertheless, not all behaviorally inhibited children in our sample were classified as insecure-ambivalent. A behaviorally inhibited child, who would typically withdraw when a stranger entered the room in the Strange Situation procedure and after being left alone, and would not be comforted by the stranger, might nevertheless be relatively easily soothed by the mother on reunion and return to play and, therefore, be classified as securely attached. Hence, it cannot be argued that behavioral inhibition and insecure-ambivalent attachment are equivalent constructs.

In summary, the current study identified both constitutional and environmental factors that were associated with the expression of anxiety in young children. Furthermore, the highest levels of anxiety were shown by children who were behaviorally inhibited and insecurely attached and whose mothers were also anxious. These results are consistent with developmental models of anxiety claiming independent contribution of behavioral inhibition and attachment to child anxiety. However, the use of concurrent measures of behavioral inhibition, attachment, and anxiety disorders means that the direction of causal effects cannot be determined. Longitudinal studies are necessary for definitive results.

There are several limitations to the current study. As this research was part of a larger longitudinal study on the effect of an intervention program aimed at reducing behavioral inhibition, and presumably the risk for anxiety disorders, the comparison group (i.e., the behaviorally uninhibited group) was relatively small in comparison to the behaviorally inhibited group, which may have influenced the results. Further studies with equivalent study and comparison groups are needed to verify the findings of this study.

The fact that mothers reported on both their own anxiety symptoms and their child's may suggest a source bias, as anxious mothers may also see their children as more anxious. Although maternal anxiety was used as a control variable in all the analyses, future studies are encouraged to use additional sources, such as teachers and fathers, to validate mothers' perception of their child's anxiety symptoms.

Another limitation concerns the assessment of preschool anxiety. As many forms of anxiety during childhood are normal and transitory in nature and are adaptive and necessary for normal development as children learn to gain control over their fears, diagnosing anxiety disorders in this young age group is difficult. However, fears and anxieties that persist and impair adaptive functioning or cause significant distress become phobias and anxiety disorders that warrant clinical attention (Barrett, Dadds, & Rapee, 1996). As, to date, no measures which specifically assess anxiety in the preschool years have been developed, we opted to exclude any items on the ADIS which were not developmentally appropriate, and particularly emphasized the degree of interference the child experienced by his/her fears and anxieties. Further development of tools for the assessment of preschool anxiety is needed.

The interpretation and generalizability of the findings are necessarily limited by the type of sample used. As noted earlier, 52% of mothers who took part in the first component of the project (which involved a laboratory assessment of behavioral inhibition) agreed to participate

in the additional attachment assessment procedure. Those children who took part in the current study were less anxious than those whose mothers refused to participate. Hence, it remains unknown whether the same pattern of results would have been found with the more anxious children, although there is some evidence for an association between subclinical levels of anxiety in preschool children and subsequent development of anxiety disorders (Biederman et al., 1990).

The relations found between behavioral inhibition, attachment security, and child anxiety raise the issue of construct overlap. However, while some overlap on a behavioral symptom level can be demonstrated, our results clearly support a significant level of independence between the constructs as well. Correlations between the constructs were only moderate in size, and not all behaviorally inhibited children had elevated anxiety levels or insecure attachment relationships with their mothers. Nonetheless, future studies may further validate these findings by including independent measures of parenting style, for example, an observational measure of maternal sensitivity.

The overall findings of this research highlight the importance of thinking about children's anxiety disorders in the context of their attachment relationships. As children with insecure attachment, and those whose parents are anxious, appear to be at risk for anxiety disorders, parental involvement in the treatment of childhood anxiety is crucial. In the case of an inhibited child with an insecure attachment relationship, improving the attachment relationship is likely to be required in addition to addressing overt behavioral symptomatology. The parent may then be guided to expose his/her child to perceived threats in a variety of challenging situations with the assurance that the parent will be there when the child needs him/her (i.e., desensitization in a secure "holding" environment).

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