Pergamon

Journal of Anxiety Disorders, Vol. 12, No. 1, pp. 1–20, 1998

0887-6185/98 $19.00 + .00

**PII S0887-6185(97)00046-7**

***RESEARCH PAPERS***

# Social Anxiety and History of Behavioral Inhibition in Young Adults

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**Abstract**—To evaluate the relationship between the childhood temperament behavioral inhibition (BI) and anxiety symptomology, we investigated differences in retrospective reports of childhood BI among undergraduates reporting one of the following: (a) Social anxiety ($n$ = 10), (b) generalized anxiety ($n$ = 13), (c) both social and generalized anxiety ($n$ = 15), and (d) minimal social and generalized anxiety ($n$ = 38). Contrary to the hypothesis that BI acts as a nonspecific risk factor for anxiety symptoms, our findings revealed that a history of childhood BI was associated with symptoms of social phobia but not generalized anxiety disorder. Moreover, participants displaying symptoms of both generalized anxiety disorder and social phobia were no more likely to show a childhood history of BI than participants displaying social phobia symptoms alone. These data suggest that a childhood history of BI may be more strongly associated with adult social anxiety than some other types of anxiety pathology. © 1998 Elsevier Science Ltd

Kagan, Reznick, and Snidman (1988) reported identifying a laboratory-based temperamental construct, *behavioral inhibition to the unfamiliar* (BI), that remains stable across childhood. A child is said to exhibit a BI temperament when his or her responses to novel stimuli or events are consistently characterized by excessive sympathetic arousal and behavioral withdrawal. Examples of inhibited behavioral responses are cessation of ongoing activity and vocalization, avoidance, retreat, isolation, extended latency to interact with novel persons or objects, and clinging to caregiver. BI is estimated to be present in 10 to 15% of normal Caucasian 2- to 3- year-olds (Kagan et al., 1988). Furthermore, re-

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searchers propose that BI has a genetic basis (Robinson, Kagan, Reznick, & Corley, 1992), is detectable early in life (as early as 9 months; Kagan & Snidman, 1991), may be stable across time (predicting behavior 10 years later; Biederman et al., 1993), and, thus, influences personality development.

Questions regarding the role of BI in the development of psychopathology have been raised. In particular, Rosenbaum, Biederman, Hirshfeld, Bolduc, and Chaloff (1991) and Biederman, Rosenbaum, Chaloff, and Kagan (1995) have discussed the issue of the specificity of the influence of BI. While data are lacking on the relationship between childhood BI and most forms of psychopathology, increased attention has been drawn to the possible linkage between childhood BI and anxiety disorders. Progress in determining whether BI is associated with anxiety disorders in general, or with specific anxiety disorders, will contribute to the understanding of the anxiety pathology and its various expressions. Moreover, as interventions for anxiety disorders become more disorder specific, it becomes increasingly important to determine whether a marker of increased risk for pathological anxiety is associated with the development of particular anxiety disorders. It has been suggested that early interventions that prepare parents of behaviorally inhibited children to respond appropriately to the emergence of specific symptoms may be helpful in deterring the progression of a behaviorally inhibited temperament into an anxiety disorder (Pollock, Rosenbaum, Marrs, Miller, & Biederman, 1995; Rosenbaum, Biederman, Pollock, & Hirshfeld, 1994).

Evidence of a link between BI and anxiety disorders has come primarily from studies of two samples of children obtained from two different populations: a clinically-derived, cross-section of children whose parents received treatment for panic disorder and agoraphobia (PDA; Rosenbaum et al., 1988) and a nonclinical sample followed longitudinally by Kagan and his associates (see Kagan et al., 1988). (For an excellent critique of BI studies, see Turner, Beidel, and Wolff, 1996.)

Results from both the direct diagnostic assessment of children exhibiting BI and from family studies suggest that a childhood history of BI, especially in its stable form and/or in combination with a familial history of pathological anxiety, increases risk for anxiety disorders. Studies have shown that the children of panic disorder patients were more likely to be behaviorally inhibited than the children of normal controls (Rosenbaum et al., 1988). In addition, the parents of behaviorally inhibited children had a higher prevalence of any anxiety disorder, any childhood anxiety disorder, and both a child and adult anxiety diagnosis (Rosenbaum, Biederman, Hirshfeld, Bolduc, Faraone et al., 1991). Furthermore, behaviorally inhibited children were found to have higher rates of phobic disorders, overanxious disorder (OAD), and multiple anxiety disorders. (For a review, see Biederman, 1990.) Biederman et al. (1993) described BI as an ''anxiety prone'' diathesis that represents a risk factor for the development of anxiety disorders in general, but not any one anxiety disorder. The proposition that childhood BI acts as a nonspecific risk factor for anxiety disor-

ders leads to the prediction that adults reporting either social-evaluative anxiety associated with social phobia or anxiety symptoms associated with another anxiety disorder should not differ in the extent to which they exhibited BI in childhood.

However, some findings from studies of behaviorally inhibited children and their families also point to the possibility that social anxiety and avoidance may be particularly associated with BI. Although social phobia was not directly assessed in the behaviorally inhibited children, Biederman (1990) noted that the phobic disorders found in association with BI frequently included social fears. Likewise, social concerns may contribute to a diagnosis of OAD. Furthermore, avoidant disorder was among those found more frequently in the behaviorally inhibited children (Biederman, 1990), especially those who had exhibited a more stable form of BI (Hirshfeld et al., 1992). At a 3-year follow-up, the significantly higher rate of multiple anxiety disorders found in the stable inhibited child was attributed to higher rates of avoidant disorder. Moreover, for children without an anxiety disorder diagnosis, the parents of children with BI were more likely to have social phobia than the parents of children without BI (Rosenbaum et al., 1992). Using another sample of temperamentally inhibited and uninhibited children, Rickman and Davidson (1994) found that the parents of the inhibited children reported significantly less extroversion; however, they did not differ from the parents of uninhibited children with respect to neuroticism.

Although Turner et al. (1996) point to a number of methodological weaknesses in the existing BI studies, they concluded that children with BI and their parents, in comparison to children and parents in control groups, have more anxiety disorders, especially disorders of a social-evaluative nature. Yet, they point out that the exact nature of the relationship between BI and social anxiety is not clear. They propose that factors such as the heritable trait of introversion (in interaction with unfamiliar environments) or a familial history of anxiety may underlie the observed association between BI and excessive anxiety in social-evaluative situations. Turner et al. (1996) suggested that stable BI may increase vulnerability to anxiety disorders, especially those including maladaptive social anxiety, yet be neither necessary nor sufficient for their development.

The proposition that childhood BI increases vulnerability for anxiety disorders that are social-evaluative in nature leads to the prediction that adults with symptoms of social phobia would be more likely than those with symptoms of another anxiety disorder to report BI during childhood. Furthermore, persons having symptoms of both social phobia and another anxiety disorder would be expected to report a level of BI comparable to the level reported by persons with social phobia symptoms alone.

Thus, the overall aim of the study was to compare two rival hypotheses concerning the nature of the relationship between childhood BI and anxiety disorders. Specifically, we tested whether a history of childhood BI is associated equally with symptoms of generalized anxiety disorder or social phobia (general

risk hypothesis) or whether a childhood history of BI is associated with symptoms of social phobia but not symptoms of generalized anxiety disorder (specificity hypothesis). We also examined whether controlling for depression and state anxiety altered the associations between childhood BI and social phobia or generalized anxiety disorder symptoms.

The decision to compare persons reporting symptoms of social phobia with those reporting symptoms of generalized anxiety disorder (GAD) was based on several considerations. First, the diagnosis of OAD had been relatively common for the BI children in the studies reviewed above. However, OAD has been eliminated from the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV*, American Psychiatric Association, 1994) with the diagnosis of GAD being recommended for use in its place. Second, it was desirable to use an anxiety disorder known to have a relatively high rate of comorbidity with social phobia. The high comorbidity rates of social phobia and GAD in clinical samples (Brown & Barlow, 1992) suggested that it would be possible to obtain an adequate sample of participants reporting symptoms of both social phobia and GAD. Finally, it was also necessary to select an anxiety disorder with an age of onset early enough to be prevalent in a population of young adults. The finding that the expected age of onset of GAD is earlier than panic disorder (Scheibe & Albus, 1992) made GAD a better candidate for a comparison anxiety disorder, even though previous BI research involved children of parents with panic disorder.

The young age and nonclinical status of participants in previous BI research influenced the selection of participants for this study. First, an undergraduate population was selected for this study in order to balance the goals of remaining focused upon a younger age group and accessing a group whose average age would exceed the expected onset for social phobia (15.5 years; Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992). Second, a nonclinical population was selected because, although significant proportions of BI children were found to have diagnosable anxiety disorders, it does not appear that most had previously engaged in treatment-seeking. Thus, our participants were recruited based upon their endorsement of anxiety symptoms and not on the basis of seeking treatment.

## METHOD

### *Participants*

Undergraduates ($N = 76$) enrolled in introductory psychology at the University of Texas at Austin took part in the study. Selection was based on meeting criteria (see below) for one of the following four groups: (a) social anxiety (SA), (b) generalized anxiety (GA), (c) both SA and GA (mixed), and (d) neither SA nor GA (control). Their participation fulfilled a course requirement. Demographics for the total sample and each group are reported in Table 1.

TABLE 1
GROUP SIZES, GENDER AND ETHNIC COMPOSITION, AND MEAN AGES

| | Total | SA | GA | Mixed | Control |
|---|---|---|---|---|---|
| *n* | 76 | 10 | 13 | 15 | 38 |
| Gender (%) | | | | | |
| Males | 34 | 40 | 31 | 27 | 37 |
| Female | 66 | 60 | 69 | 73 | 63 |
| Ethnic (%) | | | | | |
| African American | 1 | 0 | 0 | 0 | 3 |
| Asian | 15 | 30 | 0 | 33 | 8 |
| Hispanic | 20 | 30 | 15 | 20 | 18 |
| White | 61 | 30 | 85 | 47 | 66 |
| Other | 4 | 10 | 0 | 0 | 5 |
| Age | | | | | |
| *M* | 18.92 | 18.80 | 18.77 | 19.33 | 18.84 |
| (*SD*) | (1.23) | (1.23) | (0.93) | (1.45) | (1.24) |

*Note.* SA = social anxiety group; GA = generalized anxiety group; Mixed = group with social and generalized anxiety; Control = group without elevated social or generalized anxiety.

### *Procedure*

*Participant recruitment and screening.* Participants entered the study in one of two ways: phone solicitation or sign-up sheets. The Panic, Anxiety, and Social Phobia Questionnaire (PASPQ; see below), an author-constructed self-report anxiety disorders screening questionnaire was administered to approximately 2000 students in selected introductory psychology classes consisting of 100 to 500 students. Those reporting elevated social anxiety, generalized anxiety, both social and generalized anxiety, or neither social or generalized anxiety on the PASPQ were recruited by phone or sign-up sheet. A total of 168 students participated in further testing.

We administered a battery of self-report instruments (described below) to all of the 168 initial participants in groups of 5 to 30. The PASPQ was included in this battery and responses from this administration of the PASPQ were used in the participant classification procedures described below. Participants reporting distress due to symptoms associated with panic disorder were excluded. Those reporting clinically significant symptoms of anxiety or depression were offered treatment referrals.

*Classification of participants.* After assessment batteries were completed, we assigned each participant to one of the four groups (social anxiety, generalized anxiety, both social and generalized anxiety, or neither social or generalized anxiety) based upon their scores on empirically supported instruments used in the assessment of patients with social phobia and GAD. We adopted Turner,

TABLE 2
GROUP CLASSIFICATION CRITERIA AND GROUP DIFFERENCES ON CRITERIA

| | SA | GA | Mixed | Control |
|---|---|---|---|---|
| Classification criteria | | | | |
| Measures assigned cut-off scores | | | | |
| SPAI | ≥60 | <60 | ≥60 | <60 |
| PSWQ | <52 | ≥52 | ≥52 | <52 |
| Interference due to anxiety (PASPQ) | | | | |
| Social | yes | — | yes | — |
| Generalized | — | yes | yes | — |
| Prominent symptoms (PASPQ) | | | | |
| SP | yes | no | yes | no |
| GAD | no | yes | yes | no |
| Means (standard deviations) for classification measures | | | | |
| Measures assigned cut-off scores | | | | |
| SPAI | 84.00[a] (16.20) | 28.90[b] (17.32) | 88.73[a] (21.80) | 28.18[b] (15.27) |
| PSWQ | 42.60[a] (7.68) | 63.31[b] (7.04) | 66.00[b] (6.50) | 34.74[c] (7.59) |
| Interference due to anxiety item (PASPQ) | | | | |
| Social | 2.00[a] (0.00) | 0.54[b] (0.66) | 2.07[a] (0.26) | 0.30[b] (0.46) |
| Generalized | 1.29[a] (0.49) | 2.38[b] (0.51) | 2.20[b] (0.41) | 0.67[c] (0.59) |
| Symptom severity (PASPQ) | | | | |
| SP | 1.95[a] (0.16) | .87[b] (0.39) | 2.05[a] (0.21) | 0.53[c] (0.42) |
| GAD | 1.14[a] (0.24) | 2.42[b] (0.56) | 2.18[b] (0.50) | 0.72[a] (0.32) |

*Note.* SA = social anxiety group; GA = generalized anxiety group; Mixed = group with social and generalized anxiety; Control = group without elevated social or generalized anxiety; SPAI = Social Phobia and Anxiety Inventory; PSWQ = Penn State Worry Questionnaire; PASPQ = Panic, Anxiety, and Social Phobia Questionnaire; SP = social phobia symptoms (based upon 4 items from the PASPQ); GAD = generalized anxiety disorder symptoms (based upon 4 items from the PASPQ). Means in the same row that do not share superscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.

Beidel, Dancu, and Stanley's (1989) recommended cut-off score of 60 on the Social Phobia and Anxiety Inventory (SPAI) to classify participants as having significant social anxiety. Based upon Molina and Borkovec's (1994) summary of findings for analog clinical samples, we designated a score of 52 on the Penn State Worry Questionnaire (PSWQ) as the cut-off score to classify participants as having significant generalized anxiety. The cut-off score requirements for each group are indicated in Table 2.

To better accomplish study goals, an additional set of classification criteria

(summarized in Table 2) were imposed. Because we were interested in the association between a history of behavioral inhibition and current pathological levels of anxiety, we sought to increase the likelihood that participants in the anxiety groups were experiencing clinically significant anxiety. Thus, we eliminated participants from the anxiety groups who did not report at least moderate interference due to their anxiety symptoms (e.g., SA subjects had to report at least moderate interference due to social anxiety).[1] Because we were seeking to examine the distinct association between behavioral inhibition and the two selected types of anxiety (social and generalized), we considered it desirable to improve the symptomatic homogeneity of our groups. Thus, we eliminated participants from the SA group who reported prominent symptoms of GAD. Likewise, eliminated participants from the GA group who reported prominent symptoms of social phobia and eliminated from the nonanxious control group those with prominent symptoms of either social phobia or GAD.[2] Of the 168 participants originally assigned to the four groups based on the cut-off score classification, 63 were initially excluded for not meeting the interference criterion, and 29 were excluded for reporting symptoms incompatible with their initial group assignment. This resulted in a final sample of 76 participants.

## MEASURES

### *Mood Measures*

*State-Trait Anxiety Inventory-State (STAI-S).* The STAI-S (Spielberger, Gorsuch, & Lushene, 1970) is a 20-item self-report questionnaire for assessing transient anxiety using a 4-point Likert response format. Spielberger et al. reported high internal consistency (.86) for the STAI-S. We included the STAI-S to control for group differences due to the participants' state anxiety at the time of the administration of the assessment battery.

*Beck Depression Inventory (BDI).* The 21-item BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) is a widely used, psychometrically sound self-report scale for assessing depressive symptomatology. Meta-analysis of the BDI's internal consistency estimated the mean coefficient alpha for nonpsychiatric subjects to be .81 (Beck, Steer, & Garbin, 1988). Beck et al. (1988) reported that

[1] We determined level of interference by examining participants' responses to the item on the PASPQ that assessed level of interference due to social phobia symptoms (e.g., none, mild, moderate, severe, extreme) and a similar item that assessed interference due to GAD symptoms.

[2] The elimination process was based upon the first author's examination of participants' responses to the PASPQ social phobia and GAD screening items. Participants assigned to the SA group based upon cut-off scores were retained only if they were judged to be relatively free of generalized anxiety symptoms and participants assigned to the GA group based upon cut-off scores were retained only if they were judged to be relatively free of social anxiety symptoms. Furthermore, those retained in the nonanxious control group were judged to be relatively free of both social and generalized anxiety symptoms.

scores on the state sensitive BDI correlated significantly with clinical ratings and other self-report measures of depression. In addition, they noted the capacity of the BDI to differentiate between outpatients with primary depressive disorders and those with GAD. We included the BDI to control for group differences due to the participants' depressive symptomology at the time of the administration of the assessment battery.

### *Classification Measures*

*Social Phobia and Anxiety Inventory (SPAI).* The SPAI (Turner et al., 1989) is a self-report index of social and agoraphobic anxiety with a 5-point Likert scale response format. The SPAI contains two subscales: social phobia (32 items) and agoraphobia (13 items). Beidel, Turner, Stanley, and Dancu (1989) reported good test-retest reliability (.86) for the total scale and high internal consistency for the social phobia subscale (coefficient alpha is .96). The SPAI has been shown to be effective for discriminating between those with and without social phobia.

*Penn State Worry Questionnaire (PSWQ).* The PSWQ (Meyer, Miller, Metzger, & Borkovec, 1990) is a 16-item self-report questionnaire assessing the tendency to engage in excessive, generalized, and uncontrollable worry. Respondents rate how typically they engage in worry behaviors using a 5-point Likert scale. High internal consistency (coefficient alpha is .93) and good test-retest reliability (.75) have been reported for the PSWQ (Molina & Borkovec, 1994). Meyer et al. reported that the PSWQ significantly discriminated college students meeting all, some, or none of the *DSM-III-R* (American Psychiatric Association, 1987) criteria for GAD.

*Panic, Social Phobia, and Anxiety Questionnaire (PASPQ).* The PASPQ is an author-constructed self-report anxiety disorders screening questionnaire. Respondents indicate the presence/absence and severity (Likert format; e.g., 0 = none, 1 = mild, 2 = moderate, 3 = severe, 4 = extreme) of selected *DSM-IV* symptoms of panic disorder, generalized anxiety disorder, and social phobia. Respondents are allowed to ''skip out'' of the panic disorder and generalized anxiety disorder sections if essential symptoms are not present (e.g., concern about panic attacks, significant time spent worrying).

Available psychometric data for the PASPQ is limited to that gathered during this study. We psychometrically evaluated the set of four GAD symptoms items (percentage of time spent worrying, excessiveness of worry, controllability of worry, and interference due to worry) and four social phobia symptoms items (frequency of anxiety in listed social/performance situations, frequency of avoidance of these situations, excessiveness of social anxiety, and interference due social anxiety). Over the interval between the initial and second administrations of the PASPQ ($M$ = 40 days; $SD$ = 23.8 days), the average test-retest

reliability of the social phobia items was .62 ($N = 39$) with the stability of items ranging from .48 for the excessiveness item to .65 and .60 for the anxiety and avoidance items, respectively, and .74 for the interference item. Because of the skip-out feature, less data for the GAD items were available ($N = 26$). Nonetheless, a similar average reliability was found (.64). Reliabilities for the time worrying, excessive worry, and interference items were .59, .62, and .59, respectively, while the reliability of the controllability of worry item was .74.

Participants' average ratings on the PASPQ's four social phobia symptom items (administered with the complete assessment battery) were highly correlated to their SPAI scores, $r\ (75) = .82$, $p < .0001$, as were their responses on the single item rating interference due to social anxiety, $r\ (75) = .79$, $p < .0001$. The social anxiety interference item and the set of four social phobia symptom items (which included the social anxiety interference item) were highly correlated, $r\ (75) = .88$, $p < .0001$.

The participants' average ratings on the PASPQ's four GAD items were highly correlated with their PSWQ scores, $r\ (53) = .87$, $p < .0001$, as were their responses on the single-item rating interference due to generalized anxiety item, $r\ (53) = .81$, $p < .0001$. The generalized anxiety interference item and the set of four generalized anxiety phobia items (including the generalized anxiety interference item) were highly correlated, $r\ (75) = .91$, $p < .0001$.

### *Behavioral Inhibition Indices*

*Retrospective Self-Report of Inhibition (RSRI) Total Score and Subscales.* The RSRI (Reznick, Hegeman, Kaufman, Woods, & Jacobs, 1992) is a 30-item self-report questionnaire assessing a broad range of childhood behaviors associated with BI using a 5-point Likert scale response format. Selection of content for RSRI items was primarily influenced by interviews with children and parents of the Kagan et al. longitudinal study of BI and the theoretical assumption that BI is a broad construct with several components (e.g., social, nonsocial, and generalized fears, as well as somatic complaints). Internal consistencies (coefficient alphas) ranging from .79 for undergraduate samples to .91 for a sample that included psychiatric outpatients have been reported. Although parents of (undergraduate) children were found, on average, to report consistently lower levels of BI in their children than the children reported, the agreement between undergraduates and their parents was high ($r = .63$). Reznick et al.'s analyses revealed two factors: Social/School (12 items) and Fear/Illness (12 items). Because we wanted to analyze group differences on nonsocial fear and illness items separately, we factor analyzed the 168 participants' responses on Reznick et al.'s Fear/Illness subscale and forced the extraction of two rotated factors. Items were used for interpreting the factors and retained for use on the subscales only if they loaded clearly onto only one factor and did so with a loading of at least .40. The six items loading significantly onto the first factor (items 5, 6, 7, 10, 12, and 27) were primarily related to nonsocial

fears and the five items loading significantly onto the second factor (items 1, 2, 3, 4, and 16) were primarily related to illness. Only one item (number 26) from Reznick et al.'s Fear/Illness was eliminated. The new Illness and Nonsocial Fear factors were highly correlated with the total RSRI: Nonsocial Fear, $r$ (168) = .62, $p < .0001$; Illness, $r$ (168) .58, $p < .0001$. The new Illness and Nonsocial Fear factors were moderately correlated, $r$ (168) = .43, $p < .0001$. Although both new factors were significantly correlated with Reznick et al.'s original factor Social/School, the correlations were modest, Illness: $r$ (168) = .27, $p < .001$ and Nonsocial Fear: $r$ (168) = .24, $p < .01$. Reznick et al.'s original factors and our new Illness and Nonsocial Fear factors were treated as subscales in this study and, together with the total RSRI score, were used as indices of BI.

## STATISTICAL ANALYSES

Differences between the SA, GA, mixed, and control groups on the demographic variables were evaluated using chi-square tests. Group differences on the set of classification measures were analyzed using a multivariate analysis of variance (MANOVA; alpha level of .05). Following the MANOVA, analyses of variance (ANOVAs) were performed on each measure separately followed by multiple comparisons of group differences using Tukey's HSD test. Group differences on the indices of BI were analyzed using an ANOVA for the RSRI total score and a MANOVA the four RSRI subscales described above (Social/School, Fear/Illness, Illness, Nonsocial Fear). The subscale MANOVA was followed by ANOVAs for each subscale, as well as multiple comparisons for each using Tukey's HSD test. Group differences on the classification measures and on the behavioral inhibition indices were reanalyzed with multivariate analyses of covariate (MANCOVAs) and analyses of covariance (ANCOVAs) using state anxiety and depression as a covariates. Planned contrasts were then used to determine if original patterns of group differences were maintained. The results of these covariate analyses are reported only in cases where the patterns of group differences varied from original results. In our final analyses, we set aside group classifications and examined both gender and ethnic group differences in BI (using ANOVAs), a well as the strength of the relationship between childhood BI and current social anxiety (in regression analyses with the SPAI).

## RESULTS

### *Demographics*

The four groups did not significantly differ with respect to gender, age, or ethnicity.

### *Measures*

*Mood measures.* The groups were found to differ significantly on the measures of state anxiety [STAI-State, $F(3, 72) = 24.64$, $p < .0001$] and depression [BDI, $F(3, 72) = 30.18$, $p < .0001$]. With respect to the STAI-S [SA: $M = 44.90$, $SD = 12.20$; GA: $M = 44.38$, $SD = 11.44$; Mixed: $M = 54.60$, $SD = 9.43$; Control $M = 30.32$, $SD = 8.82$] and BDI [SA: $M = 10.80$, $SD = 6.61$; GA: $M = 13.62$, $SD = 7.52$; Mixed: $M = 19.80$, $SD = 7.20$; Control M = 4.08, $SD = 3.82$], the SA and GA groups did not significantly differ but each scored significantly higher than the control group. The SA and GA groups both scored significantly lower than the mixed group on the BDI. While the GA group scored significantly lower than the mixed group on the STAI-S, the SA group did not.

### *Classification Measures*

Means, standard deviations, and group differences for the classification measures are presented in Table 2. The groups differed significantly on the set of classification measures (SPAI, PSWQ, social anxiety interference, generalized anxiety interference, social phobia symptoms, and GAD symptoms; Wilks' lambda = 0.02, Approx. $F(18, 124.94) = 19.47$, $p < .0001$). The groups differed on the PASPQ item assessing interference due to social anxiety, $F(3, 71) = 81.13$, $p < .0001$, and the item assessing interference due to generalized anxiety, $F(3, 49) = 37.68$, $p < .0001$. Multiple group comparisons indicated that the SA and mixed groups reported comparable levels of interference due to social anxiety and each reported significantly more such interference than both the GA and control groups, whose levels of interference from social anxiety did not differ. With respect to interference due to generalized anxiety, the SA group reported significantly more interference from generalized anxiety than the control group; however, the SA and control groups each reported significantly lower levels of such interference than both the GA and mixed groups, whose level of interference due to generalized anxiety did not differ. The only difference observed when controlling for BDI and STAI-S scores was that the SA and control groups no longer differed in terms of interference due to generalized anxiety.

Each participant's responses to the set of four social phobia screening items on the PASPQ were averaged and treated as an index of social phobia symptomology. Similarly, the set of four GAD screening items were treated as an index of generalized anxiety symptomology. Significant group differences were found on the social phobia symptom screen, $F(3, 71) = 86.92$, $p < .0001$, and the GAD symptom screen, $F(3, 49) = 51.22$, $p < .0001$. Multiple group comparisons indicated that even though the GA group reported significantly more social phobia symptomology than the control group, each of these groups reported significantly less social phobia symptomology than both the SA and

mixed groups, whose level of social phobia symptoms did not differ. The GA and mixed groups reported comparable levels of GAD symptomology and each reported significantly higher levels of GAD symptomology than both the SA and control groups, whose levels of GAD symptoms did not differ. Reanalysis using the BDI and STAI-T as covariates only led to two changes in these findings: The GA group no longer had higher levels of social phobia symptomology than the control group and the GA group's level of generalized anxiety symptomology was significantly greater than that of the mixed group, $F(3, 47) = 26.83$, $p < .0001$.

Cut-off scores on the SPAI and PSWQ had been used to make the initial group assignments and, as expected, the four groups differed significantly on the SPAI, $F(3, 72) = 64.96$, $p < .0001$, and the PSWQ, $F(3, 72) = 92.11$, $p < .0001$. Multiple comparisons among the four groups indicated that the SA and mixed groups each had higher SPAI scores than both the GA and the control groups. The SA and the mixed groups did not differ significantly from each other on the SPAI. Likewise, the GA and control groups did not differ on the SPAI. Comparisons of PSWQ group means indicated that the GAD and the mixed groups did not differ and that each scored significantly higher than the SA group that, in turn, scored significantly higher than the control group. When analyses of the SPAI and PSWQ were repeated with the BDI and STAI-S as covariates, the pattern of results did not differ except that the SA and control groups no longer differed on the PSWQ.

In the absence of diagnostic structured interviews, the diagnostic status of the participants could not be ascertained. However, these analyses of the classification measures indicated that the groups differed as expected with respect to social and generalized anxiety. To clarify whether participants in the various groups were reporting normal levels of social and/or generalized anxiety or levels of anxiety observed in persons with diagnosable anxiety disorders, we compared the SPAI and PSWQ scores of the four groups with previously reported means for anxious and nonanxious samples. The mean SPAI scores for the SA and the mixed groups were more than one standard deviation above the cut-off of 60. Their mean SPAI scores were also above the mean reported by Turner et al. (1989) for socially anxious college students ($M = 72.2$), of which 90% had been diagnosed with social phobia using the Anxiety Disorders Interview Schedule (ADIS; DiNardo, O'Brien, Barlow, Waddell, & Blanchard, 1983). Furthermore, the mean SPAI scores for the SA and mixed groups were less than one standard deviation below the mean SPAI score reported by Turner et al. for a clinical sample of social phobics ($M = 94.0$). On the other hand, the mean SPAI scores for the GA and control groups were more than one standard deviation below the cut-off score and at the mean reported by Turner et al. for non-socially–anxious college students ($M = 32.7$). Thus, the GA and control groups were reporting relatively normal levels of social anxiety while the SA and mixed groups were reporting levels of social anxiety in the range typically observed for social phobics.

TABLE 3
MEANS (*M*), STANDARD DEVIATIONS (*SD*) AND GROUP COMPARISONS FOR BEHAVIORAL INHIBITION INDICES

| | SA ($n$ = 10) | | GA ($n$ = 13) | | Mixed ($n$ = 15) | | Control ($n$ = 38) | |
|---|---|---|---|---|---|---|---|---|
| BI Index | *M* | (SD) | *M* | (SD) | *M* | (SD) | *M* | (SD) |
| Resnick et al. (1992) Subscales | | | | | | | | |
| Social/school | 3.03[a] | (0.60) | 2.06[b] | (0.65) | 3.17[a] | (0.81) | 2.01[b] | (0.46) |
| Fear/illness | 2.14[a,b] | (0.57) | 1.78[a,b] | (0.40) | 2.19[a] | (0.63) | 1.70[b] | (0.43) |
| Mick and Telch Division of Fear/Illness | | | | | | | | |
| Nonsocial fear | 2.40[a] | (0.64) | 1.63[b] | (0.56) | 2.42[a] | (0.89) | 1.89[a,b] | (0.61) |
| Illness | 1.72[a,b] | (0.48) | 1.69[a,b] | (0.41) | 1.92[a] | (0.60) | 1.42[b] | (0.35) |
| Total RSRI | 2.57[a] | (0.48) | 1.99[a] | (0.37) | 2.67[a] | (0.61) | 1.89[b] | (0.31) |

*Note.* BI = behavioral inhibition; SA = social anxiety group; GA = generalized anxiety group; Mixed = group with social and generalized anxiety; Control = group without elevated social or generalized anxiety; RSRI = Retrospective Self-Report of Inhibition. Means in the same row that do not share superscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.

The mean PSWQ scores for the GA and the mixed groups were more than one standard deviation above the cut-off of 52 and within one standard deviation of means reported by Molina and Borkovec (1994) for subjects they diagnosed with GAD from their analog ($M$ = 65.77, $SD$ = 9.60) and clinical ($M$ = 67.66, $SD$ = 8.86) samples using the ADIS-R (DiNardo & Barlow, 1988). In addition, the mean PSWQ scores for the SA and the control groups were more than one standard deviation below the cut-off score. The mean of the SA group was at the mean of the subjects reported by Molina and Borkovec to be relatively untroubled by GAD symptoms but not necessarily free of other diagnosable anxiety disorders ($M$ = 44.27, $SD$ = 11.44). The mean of the control group was at the mean Molina and Borkovec reported for subjects confirmed by the ADIS-R to have no diagnosable anxiety disorder ($M$ = 30.98, $SD$ = 8.13). Thus, the degree of generalized anxiety reported by the control group was at a level typical for persons free of pathological anxiety, while the SA group's level of generalized anxiety was in the range expected for persons troubled by anxiety symptoms but not by generalized anxiety disorder. In contrast, those in the GA and mixed group reported levels of generalized anxiety in the range typically observed for persons with GAD.

### *Behavioral Inhibition Indices*

Means and standard deviations for the RSRI total score, the two Reznick et al. (1992) subscales (Social/School and Fear/Illness), and the subscales we derived (Nonsocial Fears and Illness) are presented in Table 3. A univariate test

revealed significant group difference for the total RSRI, $F(3, 72) = 16.63$, $p < .0001$, and a MANOVA revealed that the groups also differed on the set of RSRI subscales, Wilks' lambda = 0.46, Approx. $F(12, 182.85) = 5.42$, $p < .0001$. Follow-up univariate tests indicated that the groups differed on Reznick et al.'s Social/School subscale, $F(3, 72) = 19.05$, $p < .0001$, and Fear/Illness subscale, $F(3, 72) = 4.79$, $p < .01$. With respect to the newly derived subscales, the univariate tests were significant for both Illness, $F(3, 72) = 5.34$, $p < .01$, and Nonsocial Fear, $F(3, 72) = 4.82$, $p < .01$. After controlling for depression and state anxiety, group differences for the Fear/Illness and Illness subscales were no longer significant.

Multiple comparisons of group means for both the total RSRI and the Social/School subscale revealed that the GA group did not differ from the control group and each had significantly lower mean scores than both the SA and mixed groups, whose mean scores did not differ significantly. In contrast, multiple comparisons of group means for both the Fear/Illness and Illness subscales revealed that only the mixed group scored significantly higher than the control group; the intermediate scores of the SA and GA groups did not differ from the scores of either the mixed or control groups. On the Nonsocial Fear subscale, none of the anxiety groups significantly differed from the control group. Interestingly, however, the GA group scored significantly lower than both the SA and mixed groups on Nonsocial Fear. As noted above, controlling for the BDI and STAI-S eliminated any group differences on the Fear/Illness and Illness subscales. Furthermore, the mixed group's total RSRI score was no longer significantly higher than that of the control group. However, the patterns of group differences on the Social/School and Nonsocial Fear subscales remained unchanged.

### *Behavioral Inhibition, Social Anxiety, Gender, and Ethnicity*

Setting our anxiety and nonanxious control groupings aside, we conducted regression analyses to determine the strength of the relationship between our behavioral inhibition indices and our primary measure of social anxiety (SPAI). Moderately high associations were found between SPAI and both the total RSRI, $r(76) = .70$, $p < .0001$, and the Social/School subscale, $r(76) = .75$, $p < .0001$. Furthermore, the Nonsocial Fear and the Illness subscales were also significantly correlated with the SPAI, $r(76) = .38$, $p < .001$; $r(76) = .39$, $p < .01$; respectively.

Gender differences on indices of BI were also examined. The total RSRI scores of males and females did not differ. However, using a MANOVA to analyze gender differences on the set of RSRI subscales, we found that males and females differed significantly [Wilks' lambda = 0.82, Exact $F(3, 72) = 3.56$, $p < .05$]. Follow-up ANOVAs indicated that gender differences were not present for the Social/School and Illness subscales; however, females ($M = 2.15$, $SD = .73$) reported significantly more inhibition than males ($M = 1.76$,

*SD* = .63) on the Nonsocial Fears subscale, $F(1, 74) = 5.23$, $p < .05$. This prompted us to conduct a Group × Gender ANOVA for Nonsocial Fear. The effect of group, $F(3, 68) = 5.08$, $p < .01$, was significant while the gender and interaction effects were not. Thus, group differences on the Nonsocial Fear component of BI cannot be attributed to gender differences on this subscale.

Finally, ethnic differences on indices of BI were assessed. To do so, we excluded the six participants whose ethnicity did not match our designated ethnic categories and the one African American. Then we examined BI differences among our three best represented groups (11 Asians, 15 Hispanics, and 46 whites). The total RSRI differed among ethnic groups, $F(2, 69) = 7.96$, $p < .001$. Multiple group comparisons indicated that Asians ($M = 2.64$, $SD = 0.63$) scored significantly higher than Whites ($M = 2.01$, $SD = 0.42$). The mean RSRI score of the Hispanic group ($M = 2.22$, $SD = 0.53$) fell between the means for the Asian and White groups and did not differ significantly from either. A MANOVA on the RSRI subscales (Social/School, Nonsocial Fear, Illness) revealed that the ethnic groups differed on the set of subscales [Wilks' lambda = 0.74, Approx. $F(6, 134) = 3.64$, $p < .01$]. Follow-up ANOVAs indicated that ethnic differences were not present for the Nonsocial Fear and Illness subscales. However, the ethnic groups differed significantly on the Social/School subscale, $F(2, 69) = 10.78$, $p < .001$, with Asians ($M = 3.21$, $SD = 0.73$) reporting significantly more inhibition than Hispanics ($M = 2.44$, $SD = 0.71$) and whites ($M = 2.15$, $SD = 0.66$). This led us to conduct a Group × Ethnicity ANOVA for the Social/School subscale. The effect of group, $F(2, 61) = 12.70$, $p < .0001$, was significant, while the effect of ethnicity and of the interaction of group and ethnicity were not significant. Thus, group differences on the Social/School component of BI cannot be attributed to ethnic differences on this subscale.

## DISCUSSION

Results from the present study fail to support the hypothesis that a childhood history of behavioral inhibition is associated with anxiety symptoms in general. This conclusion is supported by our finding that participants in the generalized anxiety group were no more likely to report childhood behavioral inhibition than were participants in the nonanxious control group. Instead, our findings provide some support for the specificity of an association between behavioral inhibition and social anxiety: Participants reporting current impairment due to social anxiety, whether alone or in combination with generalized anxiety, reported significantly more childhood behavioral inhibition relative to participants reporting only generalized anxiety or participants reporting neither social nor generalized anxiety (nonanxious controls). Taken together these findings point to the possibility that a childhood history of behavioral inhibition may be particularly characteristic of persons reporting elevated social anxiety in adulthood. While preliminary, our results suggest that future investigations examining the

linkage between behavioral inhibition and specific anxiety disorders need to assess and control for social anxiety.

Not surprisingly, those with current social anxiety reported significantly more childhood inhibition in social and school situations than participants with heightened generalized anxiety or nonanxious controls. More interesting was our finding that groups with elevated social anxiety also scored highest on a subscale of behavioral inhibition unrelated to social fears (Nonsocial Fear). This latter finding provides some support for the conclusion that the linkage between adult social anxiety and reports of childhood behavioral inhibition are not simply due to the overlap in social fear items.

Although previous studies have shown a relationship between behavioral inhibition and multiple anxiety disorder diagnoses (for a review, see Biederman, 1990), these studies have not examined the relative influence of the different components believed to make up behavioral inhibition. Note that only participants in our combined social and generalized anxiety groups reported more childhood illness and somatic concerns than nonanxious controls. Although speculative, one interpretation of this finding is that illness and somatic concerns present in childhood may be linked to the later development of multiple anxiety problems. However, it should be noted that the Illness subscale score of our combined anxiety group was no longer significantly higher than that of the nonanxious controls after controlling for depression and state anxiety.

The relationship observed between current social anxiety and behavioral inhibition was not completely consistent across the features thought to characterize behavioral inhibition in childhood. However, our finding that all the components of behavioral inhibition we examined were significantly associated with our primary measure of social anxiety (SPAI) further supports the link between childhood behavioral inhibition and current social anxiety.

Were the GAD symptoms reported by those in the generalized anxiety and mixed groups a function of depression? Several factors argue against this hypothesis. First, it should be noted that the SA and GA groups did not differ significantly with respect to depression. Second, analyses of the group differences on the generalized anxiety measure (PSWQ) using depression (BDI) as a covariate yielded a pattern of results identical to those reported above. In addition, the observed differences in behavioral inhibition between the GA and SA groups remained significant even after controlling for depression. Moreover, the BDI means for the SA and GA groups were at the mean reported by Beck et al. (1988) for a sample of GAD outpatients ($M = 14.46$, $SD = 6.10$) and well below the mean of a comparison sample of outpatients with depressive disorders ($M = 26.37$, $SD = 6.94$).

Previous behavioral inhibition studies have not reported gender differences and, because they have primarily focused upon Caucasians (Turner et al., 1996), have not reported ethnic differences. Our finding that females scored higher than males on the Nonsocial Fear subscale of our behavioral inhibition measure

is consistent with findings that females report more nonsocial phobias than males (Bourdon, Boyd, Rae, Burns, Thompson, & Locke, 1988). However, further analyses revealed that these observed gender differences did not account for the observed differences among our anxiety groups on inhibition in response to nonsocial fear. Ethnic differences were observed on the Social/School subscale of our behavioral inhibition measure with Asians reporting more inhibition in this domain than Hispanics and Whites. Again, further analyses revealed that these ethnic differences did not account for the observed differences among our anxiety groups on social and school-related inhibition. Nonetheless, more thorough investigation of gender and ethnic differences in behavioral inhibition is warranted.

Our findings must be considered in light of the study's limitations. First, despite screening a large number of students, our final sample sizes were small. This may have resulted in low statistical power for detecting low or moderate effect size difference between groups. Another limitation is the retrospective nature of the study. It is possible that the association between childhood behavioral inhibition and adult social anxiety may have been due to exaggerated reports of childhood behavioral inhibition by those with current social anxiety. Likewise, persons with symptoms of GAD may not accurately report their histories of nonsocial inhibition. Thus, including independent informants (e.g., parents) to rate participants' childhood behavioral inhibition would have strengthened our conclusions. However, note that Reznick et al. (1992) found a strong agreement between participants' and their parents' reports of the participants' childhood behavioral inhibition.

The criteria for classifying participants deserve comment. The purpose of applying classification criteria beyond cut-off scores was to create homogeneous groups and to increase the likelihood that participants in the anxiety groups were experiencing interference in functioning due to their anxiety symptoms. These stringently defined groups were used in order to examine the extent to which a childhood history of behavioral inhibition is uniquely associated with current elevations in social or generalized anxiety. However, we acknowledge that our reliance on self-report measures is problematic and precluded a determination of whether participants met diagnostic criteria for social phobia or GAD. Replication using structured diagnostic interviews is needed for determining social phobia and GAD diagnoses.

What might account for the apparent asymmetry in linkages between behavioral inhibition and anxiety disorders? Our findings taken together with those from previous work suggest that behavioral inhibition may be related to panic disorder/agoraphobia (PDA) as well as social-evaluative anxiety, but not symptoms of generalized anxiety. One possibility is that the association between behavioral inhibition and PDA may be a function of comorbid social anxiety symptoms. To test this hypothesis, future studies examining the linkage between behavioral inhibition and PDA should control for the effects of social anxiety.

Rosenbaum et al.'s (1994) offer an alternative explanation for the observed linkages between behavioral inhibition and both PDA and social phobia. They propose that behavioral inhibition serves as a diathesis that may be expressed differently across the life span.

Another explanation of the asymmetry in linkages between behavioral inhibition and anxiety disorders stems from the observation that PDA patients and social phobics often exhibit avoidant behavior that seems consistent with a behaviorally inhibited temperament. This tendency to avoid situations and events does not seem to be as characteristic of GAD patients. Comparing histories of behavioral inhibition for groups of PD patients with and without agoraphobic avoidance and social phobics with high and low levels of phobic avoidance may help clarify whether the presence of an avoidant coping style accounts for the association of childhood behavioral inhibition with social phobia and PDA.

Turner et al. (1996) offer a model in which behavioral inhibition is viewed as one of several factors that may increase vulnerability to anxiety disorders. We hypothesize that a behaviorally inhibited temperament may contribute to avoidance while other factors influence which specific anxiety disorder develops. For example, heightened anxiety sensitivity in childhood may combine with a behaviorally inhibited temperament to increase risk for PDA, whereas a behaviorally inhibited temperament in the presence of extreme introversion may increase risk for social phobia. Currently, we are examining prospectively the relationship between childhood history of behavioral inhibition and anxiety sensitivity and the contribution of each to the later development of spontaneous panic attacks and elevated social-evaluative anxiety.

In Fyer's (1993) excellent review of the heritability of social anxiety, she concluded that there is no direct evidence that behavioral inhibition in childhood is related to adolescent or adult social anxiety. While caution must be used in drawing inferences from retrospective studies, our findings suggest that a childhood history of behavioral inhibition is highly characteristic of young adults reporting current interference due to elevated social anxiety. If confirmed by prospective studies, our finding of a continuity between child and adult social anxiety and inhibition strongly points to the need to develop effective childhood interventions for pathological social anxiety and avoidance.

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