



MACQUARIE
University

Macquarie University ResearchOnline

This is the author version of an article published as:

Rapee, R. M. (2014). Preschool environment and temperament as predictors of social and nonsocial anxiety disorders in middle adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*, 53(3), 320-328.

Access to the published version: <http://doi.org/10.1016/j.jaac.2013.11.014>

Copyright: Elsevier. NOTICE: this is the author's version of a work that was accepted for publication in *Journal of the American Academy of Child and Adolescent Psychiatry*. Changes resulting from the publishing process, such as peer review, editing, corrections, structural formatting, and other quality control mechanisms may not be reflected in this document. Changes may have been made to this work since it was submitted for publication. A definitive version was subsequently published in the article referenced above.

Preschool Environment and Temperament as Predictors of Social and Nonsocial Anxiety Disorders in
Middle Adolescence

RH: Predictors of Adolescent Anxiety

Ronald M. Rapee, Ph.D.

Centre for Emotional Health, Macquarie University

Accepted December 17, 2013.

This research was supported by grants from the National Health and Medical Research Council and
Australian Rotary Health to the author.

The author extends his deepest thanks to Dianne Swinsburg without whose tenacity and attention to
detail, we would not have achieved these great recruitment rates. Thanks are also given to the
original research team, Lynn Sweeney, Susan Kennedy, Michelle Ingram, and Susan Edwards.

Disclosure: Dr. Rapee reports no biomedical financial interests or conflicts of interest.

Correspondence: Ron Rapee, Centre for Emotional Health, Department of Psychology, Macquarie
University, Sydney, NSW, Australia, 2109. Ron.Rapee@mq.edu.au

Objective: Of the few risk factors identified for the development of anxiety disorders, behavioral inhibition has received the strongest support. However, studies examining prediction of anxiety disorder from inhibition over time have not been extensive and very few have assessed the impact of inhibition assessed early in life on anxiety in adolescence.

Method: The current study assessed three risk factors among 91 children when they were aged around 4 years and determined anxiety diagnoses when the children were in midadolescence (average age 15 years). Children were included in the study at preschool age if they scored high (N = 57) or low (N = 34) on behavioral inhibition. Maternal anxiousness and maternal attitudes toward the child were assessed at the same time. Diagnoses at age 15 were categorised as social anxiety disorder or other anxiety disorders.

Results: Social anxiety disorder at age 15 was predicted by both inhibition and maternal anxiousness at age 4, while other anxiety disorders were predicted only by maternal anxiousness. Almost 37% of inhibited preschool-aged children demonstrated social anxiety disorder at age 15, compared with 15% of uninhibited children.

Conclusions: The results support a growing body of research pointing to the importance of behavioral inhibition as a risk for social anxiety well into adolescence and also highlight maternal anxiousness as a more general risk across anxiety disorders.

Key words: adolescence; anxiety disorders; risk factors; social anxiety; temperament

Anxiety disorders are among the most chronic forms of mental disorder¹. They typically begin relatively early in life and most have low rates of remission. The median age of onset for anxiety disorders is around 11 years and 75% of all anxiety disorders have developed by age 21². One of the most chronic of the anxiety disorders, social anxiety disorder, has an average onset in early to midadolescence, a period that also coincides with the marked increase in prevalence of depression³. Anxiety disorders and especially social anxiety disorder typically have a strong negative impact during the adolescent years¹. Thus, adolescence is a key period for the development and adverse impacts of mental disorders, especially anxiety disorders. In turn, anxiety disorders during adolescence are strong predictors of continued difficulties into adulthood, including adult anxiety and mood disorders^{4,5}.

Several comprehensive models of the development of anxiety disorders in youth have been proposed and emphasise a relatively consistent set of factors⁶⁻¹⁰. Central among these risk factors are temperament, parent psychopathology, and parent-child relationships.

Temperamental risk for anxiety has focussed on withdrawn and inhibited behaviors, with the most widely described temperamental risk being behavioral inhibition. Behavioral inhibition describes a style of extreme withdrawal and avoidance in response to novelty and social situations^{11,12}. Behavioral indicators include a reticence to speak or engage with peers, hesitation to interact with or approach unfamiliar people or objects, and for young children, a tendency to stay close to their mother. Related temperament types have also been described including social withdrawal, shyness, and fearfulness¹³⁻¹⁵. The similarity and overlap with anxiety disorders, especially with social anxiety disorder is obvious (hesitant

peer interactions, social withdrawal) and considerable debate has considered whether these constructs should be seen as interchangeable¹⁶⁻¹⁸. However, based on several differences between the constructs (e.g., moderate correlations, different responsiveness to environmental agents, different life impact), most authors have concluded that inhibition and anxiety disorder can be conceptualised as independent, although highly related, constructs. A wealth of evidence has supported the relationship between behavioral inhibition and anxiety disorders and importantly, a number of these studies have been longitudinal, supporting early inhibition as a risk for later anxiety disorder¹⁷. Some research has suggested that this relationship is found only with social anxiety disorder and that behavioral inhibition is not a significant risk for other anxiety disorders¹⁹⁻²¹, although some studies have shown slightly broader associations²²⁻²⁴. A recent meta-analysis showed that behaviorally inhibited children have a 7-fold risk to develop later social anxiety disorder compared with uninhibited children²⁵. However, the strength of this relationship appears to decrease with time between assessments. In other words studies in which BI and anxiety are assessed further apart show a slightly smaller prediction than studies in which the two variables are assessed closer in time. It may be expected then that behavioral inhibition measured early in childhood will be a less important predictor of anxiety into middle adolescence than it is for anxiety assessed during childhood.

To date, only 2 separate cohorts have been used to assess the relationship between behavioral inhibition during childhood and anxiety disorders in adolescence^{21,26}. In the first long-term study, 112 children were assessed for inhibition based on laboratory observation when they were around 2 years of age and were categorised at either of the two extremes (behaviorally inhibited or behaviorally uninhibited)²¹. By early adolescence (mean age 13 years), 74 participants were assessed on structured diagnostic interview. Those who had

been categorised as behaviorally inhibited when they were toddlers were significantly more likely to meet current criteria for social anxiety disorder than those initially assessed as uninhibited (61% vs. 21%). In a later study 122 adolescents aged between 14 and 16 years who had previously been assessed for behavioral inhibition were diagnosed with structured clinical interview for lifetime disorders²⁶. The children had been assessed for inhibition four times from 14 months to 7 years of age and were divided into two groups, stable inhibition (behavioral inhibition on all four occasions across childhood, N = 15) and low inhibition or inhibition on less than four occasions (N = 107). Adolescents showing stable inhibition according to maternal reports were more likely to meet diagnostic criteria for lifetime social anxiety disorder (40% vs. 15%) and the difference for any anxiety disorder approached significance (60% vs. 53%).

If behavioral inhibition accounts for only a modest proportion of variance in anxiety disorder by adolescence, then it is important to identify other factors that may also be involved. As described above, two core factors that have been proposed include parent psychopathology and parent-child relationship. Parents of anxious children have been shown to be more likely to themselves meet criteria for anxiety disorders and generally to be higher on negative affectivity^{27,28}. This work has mostly been cross-sectional although a few studies have demonstrated that parent negative affect can act as a risk for later child anxiety^{22,24,29}. At present no studies have assessed parent negative affect when the child was very young and examined its influence on the child's anxiety in the adolescent years.

A greater amount of research has focused on the relationship between childhood anxiety and parenting styles and behaviors. A large number of studies, both retrospective and concurrent, and using both verbal reports and observational assessment, has shown that parents of anxious children are more critical (harsh, low in warmth) and involved

(protective, controlling) than other parents³⁰⁻³². The vast majority of these studies are concurrent, although several studies have now shown that overinvolved parenting at one time can predict child anxiety at a later time^{22,29,33,34}. Little prospective research has evaluated this effect among adolescents. Given the greater distinction from parents during adolescence³⁵, it might be expected that the parent–child relationship would predict less variance in anxiety, both concurrently and prospectively, during adolescence than earlier in childhood. While this may be true, at least one study has shown that parent overprotection among 12 year old girls was still a significant predictor of the girls' anxiety 12 months later, but only according to adolescents' reports of their own anxiety and not according to maternal reports of the girls' anxiety³⁶.

Only one study has currently provided an examination of several potential predictors of anxiety from very early in life to adolescence³⁷. In this study, 155 children were followed from birth to age 17 and assessed on a variety of measures relevant to temperament, peer relationships and parent–child relationship. Of relevance to the current study, behavioral reactivity in infancy predicted emotional regulation in preschool, which predicted symptoms of anxiety in childhood and ultimately childhood anxiety predicted symptoms of anxiety in adolescence. In addition, a history of insecure attachment predicted emotional regulation and social competence in preschool, which both predicted later anxiety. This analysis demonstrated a possible developmental trajectory through which early temperament may predict adolescent anxiety, although a direct relationship between early temperament and adolescent anxiety was not examined.

The aim of the current study was to evaluate the influence of three key risk factors assessed during the child's preschool years on their expression of anxiety disorders in middle adolescence. The risk factors assessed during early childhood (when the children

were on average 4 years of age) included behavioral inhibition, maternal attitudes toward the child, and maternal anxiousness. The sample was selected at the two extremes on inhibition and hence this risk factor was examined in greater detail. Given the findings relating behavioral inhibition specifically to social anxiety disorder, the current study also distinguished between social anxiety and all other anxiety disorders as outcomes.

Method

Participants: Participants for the study included 91 young people with an average age of 15.4 years (SD = 0.9; range 12.4–17.2 years). Participants were initially recruited when they were at preschool age (mean = 3.8 years; SD = 0.4; range = 3.0–4.6 years) through 95 preschools in the Sydney area. Mothers of the children at that time returned a screening measure of inhibition (Short Temperament Scale for Children)³⁸ and those scoring high or low (> 30 or < 15) on the approach subscale were invited to a laboratory observation assessment for behavioral inhibition. Children high (BI) or low (BUI) on inhibition according to observation were included in the study. The BI children in this study had been included as the control group in an additional study of anxiety prevention^{39,40}. Eight of the families (9%) described themselves as of European heritage, 6 (7%) as having Asian heritage, and the remainder identified only as Australian.

For the current study, the sample was re-contacted approximately 11 years after initial recruitment. Rigorous attempts were made to contact the original families. Addresses for a relative had been obtained in the initial trial and, for those families who were not contactable in this way, a number of strategies were used to locate them including searching electoral rolls, searching telephone directories across Australia, calling the original daycare, contacting fathers' work addresses, and contacting neighbours. These strategies

allowed us to locate 100 of the original 119 participants (84%). Of the located participants, 9 refused participation or did not return data. This left a total of 91 participants (76 % of the original sample; 77% of the BI group and 76% of the BUI group) who returned data for the current study. The final sample included 57 in the BI group (24 boys and 33 girls; mean age = 15.2, SD = 0.8 years) and 34 in the BUI group (20 boys and 14 girls; mean age = 15.7, SD = 0.9 years). The groups did not differ significantly on gender, $\chi^2(1, N=91) = 2.38, p = .12$, although there was a significant difference on age, $t(89) = 2.56, p = .012$.

Measures

Assessment at Age 4

Laboratory Assessment: The laboratory assessment at age 4 was designed to assess for behavioral inhibition status and followed the procedures described by Kagan *et al.*, e.g.,^{41,42}.

Inhibition was determined through assessment of 5 behaviors across a total of 4 tasks. The tasks included the following: a 15-min interaction with a same-age peer, interaction with 2 strangers wearing a cloak and a gas mask, interaction with an unusual looking toy, and acceptance of simple medical procedures (e.g., chest electrodes, blood-pressure cuff).

Across these tasks, children were categorized as behaviorally inhibited if they demonstrated total talk of less than 1 min, stayed within arm's length of mother for more than 1 min, stared at their peer for more than 2 min, and approached the strangers twice or less, and peer once or less. Children not scoring within these parameters were categorized as behaviourally uninhibited. To determine a laboratory observation score these behaviours in addition to the total time spent smiling were standardized around their mean and averaged. Inter-rater agreement for these behaviours ranged from 0.50 to 0.93, with a mean of 0.76.

Temperament Questionnaire.

Both parents also completed the Temperament Assessment Battery for Children– Revised TABC-R: ⁴³. The Social Inhibition subscale was used in the current study.

Maternal Anxiousness

The Depression Anxiety Stress Scales, short form, trait version DASS21: ⁴⁴ was completed by mothers to reflect their own characteristic levels of negative affectivity. Interest in the current study was on maternal anxiousness and therefore only the anxiety and stress subscales were included in the analyses.

Maternal Attitudes

The 5-minute speech sample FMSS: ^{45,46} is a brief measure of Expressed Emotion (EE) that scores the attitudes of parents (in this study, mothers) toward a target relative (in the current study, the child), based on an audio-taped, 5-min monologue about that person. The affective tone and content of the speech sample are examined for evidence of two distinct dimensions, criticism and emotional overinvolvement (EOI). Consistent with previous studies e.g., ^{47,48}, within the criticism and EOI dimensions, the categories of borderline and high were combined and referred to as “high”.

We have previously reported from the current sample that mothers of BI children report higher EOI than mothers of BUI children at age 4 ⁴⁸. In that study we reported solid interrater reliability for both subscales: criticism - ICC = .88; EOI - ICC = .84.

Assessment at Age 15

Diagnoses: Current diagnoses were assigned by clinical psychologists following structured interview with the Anxiety Disorders Interview Schedule for *DSM-IV*, Parent and Child versions ADIS-PC: ⁴⁹. Interviewers received training to criterion and for the current study diagnoses of any of the anxiety disorders were relevant. Inter-rater agreement for a

diagnosis of anxiety or depression based on composite parent and child report was calculated in a companion study that overlapped with the current sample⁵⁰ and was reported to be solid: kappa = .79.

Procedure

For this follow-up study, participants were contacted and asked for their willingness to engage in a single assessment session of approximately 2–3 hours involving personal interviews and completion of questionnaires. Participation was sought from the target adolescent and their mother who were offered \$A100 as reimbursement for their time. Mothers were selected to maintain consistent parent gender and since they were more likely than fathers to provide data and to have been the primary caregiver.

Families who agreed to participate were sent a secure web link to complete the questionnaires online and an appointment was made at the university for diagnostic assessment. The assessing clinicians were blind to the baseline inhibition status of the child. Where diagnoses were identified or marked distress was apparent, families were offered referral options. This study was approved by the Macquarie University Human Research Ethics Committee.

Data Analysis

Because the groups were initially selected on the basis of behavioral inhibition status and in order to compare with previous research, initial analysis utilised chi-square to compare the 2 inhibition groups on clinical diagnoses at age 15. Later analyses utilized continuous measures of inhibition (maternal report on the TABCR and total score on laboratory assessment) as well as measures of maternal attitudes (maternal criticism and

emotional overinvolvement on the FMSS) and maternal anxiousness to predict the child's anxiety at age 15. For these analyses, comparisons were made between two possible anxiety outcomes at 15 years: a clinical diagnosis of social anxiety disorder and a clinical diagnosis of an anxiety disorder other than social anxiety disorder. Bivariate correlations were initially calculated between each age 4 predictor and the age 15 diagnostic outcomes. A structural equation model was then conducted in which the observed variables social anxiety disorder at age 15 and anxiety disorders other than social anxiety at age 15 were each predicted from three latent variables assessed at age 4 as follows: Maternal attitude was predicted from the two facets obtained from the FMSS, criticism and emotional overinvolvement; Maternal anxiousness was estimated from the anxiety and stress subscales of the DASS; Child inhibition was estimated from the mother's report of inhibition on the TABC-R and the laboratory observation total score (see Figure 1).

Results

Categorical Associations Between Behavioral Inhibition and Diagnostic Status

The number of adolescents in each group who met DSM-IV diagnostic criteria for each of the major anxiety disorders was compared (Table 1). Participants in the BI group were significantly more likely to meet criteria for social anxiety disorder, $\chi^2(1, N=91) = 5.11, p = .02$, and any anxiety disorder, $\chi^2(1, N=91) = 5.37, p = .02$. The groups did not differ significantly on the number with separation anxiety disorder, $\chi^2(1, N=91) = 1.22, p = .27$, generalized anxiety disorder, $\chi^2(1, N=91) = 1.29, p = .26$, specific phobia, $\chi^2(1, N=91) = 1.27, p = .26$, obsessive compulsive disorder, $\chi^2(1, N=91) = 2.50, p = .11$, or any anxiety disorder excluding social anxiety disorder, $\chi^2(1, N=91) = 1.80, p = .18$.

Prediction of Age 15 Diagnoses From Baseline Measures

Bivariate (Pearson) correlations were calculated between variables assessed at age 4 and diagnoses of either social anxiety disorder or an anxiety disorder other than social anxiety at age 15. Results are shown in Table 2. As can be seen, social anxiety disorder at age 15 was significantly associated with inhibition at age 4 (assessed by either maternal report or laboratory observation) and with maternal trait anxiety and stress. Nonsocial anxiety disorders were significantly associated only with maternal trait anxiety and stress. To further examine relationships between variables, differences as age 4 between the BI and BUI groups on the other main variables were examined with t-tests and are reported in Table 3.

The variables were then combined in a structural equation model to predict age 15 diagnoses (social anxiety or other anxiety) from baseline measures as described in the Method section. Due to the very low correlation between the two measures of expressed emotion (maternal critical comments and emotional overinvolvement, these variables were included in the model as observed variables. However, since they shared method variance, their error terms were allowed to covary as were the errors associated with the two diagnostic measures derived from structured interview. The model provided a good fit to the data with a non-significant chi square, χ^2 (df = 14) = 16.26, $p=.298$, and satisfactory fit indices, CFI = .98, TLI = .96, IFI = .99, RMSEA = .042.

According to the model (Figure 1), age 15 social anxiety disorder was significantly predicted by age 4 inhibition, $\beta = .30$, $p=.016$, and maternal anxiousness, $\beta = .30$, $p=.006$, while other anxiety disorders at age 15 were significantly predicted only by maternal anxiousness at age 4, $\beta = .29$, $p=.009$.

Discussion

The current results show a clear relationship between early behavioral inhibition and adolescent anxiety disorders. Consistent with most previous research this relationship was only significantly demonstrated for social anxiety disorder^{19,20}. Conceptually social anxiety disorder and behavioral inhibition have marked similarities and in many ways it is difficult to distinguish high social anxiety from high behavioral inhibition¹⁶. At the very least the temporal relationship between these constructs demonstrates consistency of social anxiousness over considerable time. However, the extent to which these terms refer to distinct constructs points to a clear early risk factor for adolescent social anxiety, which replicates a small number of previous results^{21,26}. Importantly, the relationship between behavioral inhibition and later social anxiety was consistent whether inhibition was assessed through maternal report or laboratory observation.

It should be noted that at age 15 less than 40% of the inhibited sample met diagnostic criteria for social anxiety disorder. Thus, although early behavioral inhibition is a statistically significant predictor of later anxiety disorder, clinical social anxiety disorder in adolescence is far from inevitable. Clearly a number of factors might influence the ultimate trajectory. On the positive side, research has shown that parents are able to assist their child to prevent development of social anxiety disorder up to adolescence⁵⁰. Some of the core components in these early intervention programs reflect "common sense" and it has been shown that many parents will apply these strategies with their children naturally³⁹.

On the negative side, additional factors may increase risk for adolescent anxiety. The current study examined two possible risk factors; maternal anxiousness and maternal attitudes to the child. The results showed that maternal anxiety provided additional independent risk for social anxiety disorder in adolescence. Thus, those children who were

high on behavioral inhibition and also had an anxious mother were at particular (additive) risk. The mechanism by which maternal anxiety confers risk for adolescent anxiety disorders is unclear. Interestingly, this risk factor was more general than inhibition and conferred risk for both social and nonsocial anxiety disorders. Maternal anxiousness may reflect a stronger genetic risk or loading for adolescent anxiety. However, this genetic risk is clearly one that is distinct from genes associated with behavioral inhibition since maternal anxiousness remained a significant predictor even after child inhibition was controlled²². Given that maternal anxiousness predicted both social and non-social anxiety disorders, this would suggest that genetic factors other than those involved in behavioral inhibition may be common across anxiety disorders.

Maternal anxiousness may also confer risk for adolescent anxiety through indirect mechanisms. One widely proposed mechanism is maternal overprotection¹ and indeed some research has shown that anxious mothers are more likely to be overprotective³¹. However, the current results failed to demonstrate that parenting at age 4, assessed as maternal attitudes reflecting either overprotection or criticism, were significant predictors of adolescent anxiety. Parenting is a construct that is especially difficult to measure since it is likely to be highly context specific and open to reporting bias. Use of the five minute speech sample in the current study reduced bias associated with self-report but may have lacked validity. However, at least some research has shown that emotional overinvolvement assessed by the five minute speech sample is associated with anxiousness in preschool aged children^{47,48} and even predicts later anxiety^{22,24}. It is more likely that maternal parenting style at a very young age does not have a marked direct influence on anxiety in adolescence. By the middle teenage years, young people have differentiated themselves to a considerable degree from their parents and it is likely that parenting behaviors will have less

influence at this stage than earlier in life. This does not mean that maternal overprotection may not be important in the trajectory of anxiety since adolescent anxiety is predicted by child anxiety and there is evidence that parenting styles do predict earlier anxiety¹. Thus as shown by Bosquet and Egeland³⁷, the parent–child relationship early in life may predict early child anxiousness which in turn predicts later maintenance of anxiety into adolescence.

There are several limitations to the current study. As mentioned, parenting is difficult to measure and was done so in the current study with the five minute speech sample. This measure has not been widely used in the context of anxiety, especially in the early years and further work developing reliable and valid measures of parenting suitable for use with preschool-aged children would be useful. The measure also taps a construct that is better described as “maternal attitudes” and hence the relationship to actual parenting behaviors is not direct. The current sample was larger than most previous research of its type, but was still not large in terms of longitudinal prediction. Childhood trajectories are likely to be subtle and may be dramatically influenced by relatively small effects, but the current study was not sufficiently powered to detect small effects or interactions. As an example, inhibited children were somewhat more likely to demonstrate most of the anxiety disorders in adolescence, but the effects for all but social anxiety disorder did not reach significance. It is possible that a larger sample would have demonstrated a different pattern of results. The use of both maternal report and laboratory observation to assess behavioral inhibition was a real strength. Similarly, adolescent diagnoses were assessed through clinician interviews based on both mother and adolescent. Nonetheless, maternal report was involved to some degree in most measures. Future studies may benefit from use of completely independent measurement of constructs.

It is always sobering to demonstrate the degree to which human distress can be predicted from early patterns. The current results show especially long prediction of anxiety from preschool to adolescence. The results can be interpreted as glass half full or half empty. On one hand, high behavioral inhibition and maternal anxiety early in life provide statistically strong risk for clinical anxiety disorders in the middle teenage years. On other hand less than 40% of inhibited preschool children will maintain anxiety disorders into middle adolescence and there are clearly a variety of factors that further influence development and may predict a lack of disorder. Based on our previous research, it is possible to alter the trajectory to disorder and reduce the development of anxiety disorders^{40,50}. Continued understanding of risk factors will help to further improve efforts at prevention.

1. Rapee RM, Schniering CA, Hudson JL. Anxiety disorders during childhood and adolescence: Origins and treatment. *Annual Review of Clinical Psychology*. 2009;5:311-341.
2. Kessler R, Berglund P, Demler O, Jin R, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*. 2005;62:593–602.
3. Roza SJ, Hofstra MB, van der Ende J, Verhulst FC. Stable prediction of mood and anxiety disorders based on behavioral and emotional problems in childhood: A 14-year follow-up during childhood, adolescence, and young adulthood. *American Journal of Psychiatry*. 2003;160(12):2116-2121.
4. Pine DS, Cohen P, Gurley D, Brook J, Ma Y. The risk for early-adulthood anxiety and depressive disorders in adolescents with anxiety and depressive disorders. *Archives of General Psychiatry*. 1998;55:56-64.
5. Stein MB, Fuetsch M, Muller N, Hofler M, Lieb R, Wittchen H-U. Social anxiety disorder and the risk of depression: A prospective community study of adolescents and young adults. *Archives of General Psychiatry*. Mar 2001;58(3):251-256.
6. Manassis K, Bradley SJ. The development of childhood anxiety disorders: Toward an integrated model. *Journal of Applied Developmental Psychology*. 1994;15:345-366.
7. Chorpita BF, Barlow DH. The development of anxiety: The role of control in the early environment. *Psychological Bulletin*. 1998;124:3-21.
8. Ollendick TH, Hirshfeld-Becker DR. The developmental psychopathology of social anxiety disorder. *Biological Psychiatry*. 2002;51:44-58.

9. Hudson JL, Rapee RM. From anxious temperament to disorder: An etiological model of generalized anxiety disorder. In: Heimberg RG, Turk CL, Mennin DS, eds. *Generalized anxiety disorder: Advances in research and practice*. New York: Guilford Publications Inc.; 2004:51-76.
10. Murray L, Creswell C, Cooper P. The development of anxiety disorders in childhood: An integrative review. *Psychological Medicine: A Journal of Research in Psychiatry and the Allied Sciences*. 2009;39(9):pp.
11. Kagan J, Reznick JS, Clarke C, Snidman N, Garcia-Coll C. Behavioral inhibition to the unfamiliar. *Child Development*. 1984;55:2212-2225.
12. Fox NA, Henderson HA, Marshall PJ, Nichols KE, Ghera MM. Behavioral inhibition: Linking biology and behavior within a developmental framework. *Annual Review of Psychology*. 2005;56:235-262.
13. Prior M, Smart D, Sanson A, Oberklaid F. Does shy-inhibited temperament in childhood lead to anxiety problems in adolescence? *Journal of the American Academy of Child and Adolescent Psychiatry*. 2000;39(4):461-468.
14. Windle M. Revised dimensions of temperament survey (DOTS-R): Simultaneous group confirmatory factor analysis for adolescent gender groups. *Psychological Assessment*. 1992;4(2):228-234.
15. Rubin KH, Asendorpf JB. Social withdrawal, inhibition, and shyness in childhood: Conceptual and definitional issues. In: Rubin KH, Asendorpf JB, eds. *Social withdrawal, inhibition, and shyness in children*. Hillsdale, New Jersey: Lawrence Erlbaum; 1993:3-17.
16. Rapee RM, Coplan RJ. Conceptual relations between anxiety disorder and fearful temperament. In: Gazelle H, Rubin KH, eds. *Social anxiety in childhood: Bridging*

developmental and clinical perspectives. New Directions for Child and Adolescent Development. Vol 127. San Francisco, CA: Jossey-Bass; 2010:17-31.

17. Degan KA, Almas AN, Fox NA. Temperament and the environment in the etiology of childhood anxiety. *Journal of Child Psychology and Psychiatry.* Apr 2010;51(4):497-517.
18. Turner SM, Beidel DC, Wolff PL. Is behavioral inhibition related to the anxiety disorders? *Clinical Psychology Review.* 1996;16:157-172.
19. Biederman J, Hirshfeld-Becker DR, Rosenbaum JF, et al. Further evidence of association between behavioral inhibition and social anxiety in children. *The American Journal of Psychiatry.* Oct 2001;158(10):1673-1679.
20. Hirshfeld-Becker DR, Biederman J, Henin A, et al. Behavioral inhibition in preschool children at risk is a specific predictor of middle childhood social anxiety: A five-year follow-up. *Journal of Developmental and Behavioral Pediatrics.* 2007;28(3):225-233.
21. Schwartz CE, Snidman N, Kagan J. Adolescent social anxiety as an outcome of inhibited temperament in childhood. *Journal of the American Academy of Child and Adolescent Psychiatry.* 1999;38(8):1008-1015.
22. Hudson JL, Dodd HF, Lyneham HJ, Bovopoulos N. Temperament and family environment in the development of anxiety disorder: Two-year follow-up. *Journal of the American Academy of Child and Adolescent Psychiatry.* Dec 2011;50(12):1255-1264.
23. Hirshfeld DR, Rosenbaum JF, Biederman J, et al. Stable behavioral inhibition and its association with anxiety disorder. *Journal of the American Academy of Child and Adolescent Psychiatry.* 1992;31(1):103-111.

24. Hudson JL, Dodd HF. Informing early intervention: Preschool predictors of anxiety disorders in middle Childhood. *PLoS ONE*. 2012;7(8):e42359.
25. Clauss JA, Blackford JU. Behavioral inhibition and risk for developing social anxiety disorder: A meta-analytic study. *Journal of the American Academy of Child and Adolescent Psychiatry*. Oct 2012;51(10):1066-1075.
26. Chronis-Tuscano A, Degnan KA, Pine DS, et al. Stable early maternal report of behavioral inhibition predicts lifetime social anxiety disorder in adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*. Sep 2009;48(9):928-935.
27. Lieb R, Wittchen H-U, Hofler M, Fuetsch M, Stein MB, Merikangas KR. Parental psychopathology, parenting styles, and the risk of social phobia in offspring: A prospective-longitudinal community study. *Archives of General Psychiatry*. Sep 2000;57(9):859-866.
28. Hettema JM, Neale MC, Kendler KS. A review and meta-analysis of the genetic epidemiology of anxiety disorders. *American Journal of Psychiatry*. 2001;158(10):1568-1578.
29. Edwards SL, Rapee RM, Kennedy S. Prediction of anxiety symptoms in preschool-aged children: Examination of maternal and paternal perspectives. *Journal of Child Psychology and Psychiatry*. 2010;51(3):313-321.
30. Rapee RM. Potential role of childrearing practices in the development of anxiety and depression. *Clinical Psychology Review*. 1997;17:47-67.
31. Wood JJ, McLeod BD, Sigman M, Hwang W, Chu BC. Parenting and childhood anxiety: theory, empirical findings, and future directions. *Journal of Child Psychology and Psychiatry*. 2003;44(1):134-151.

32. Bögels SM, Brechman-Toussaint ML. Family issues in child anxiety: Attachment, family functioning, parental rearing and beliefs. *Clinical Psychology Review*. 2006;26(7):834-856.
33. Bayer JK, Sanson AV, Hemphill SA. Parent influences on early childhood internalizing difficulties. *Journal of Applied Developmental Psychology*. 2006;27:542-559.
34. Rubin KH, Nelson LJ, Hastings P, Asendorpf J. The transaction between parents' perceptions of their children's shyness and their parenting styles. *International Journal of Behavioral Development*. 1999;23(4):937-957.
35. Furman W, Buhrmester D. Age and sex differences in perceptions of networks of personal relationships. *Child Development*. 1992;63:103-115.
36. Rapee RM. Early adolescents' perceptions of their mother's anxious parenting as a predictor of anxiety symptoms 12 months later. *Journal of Abnormal Child Psychology*. 2009;37(8):1103-1112.
37. Bosquet M, Egeland B. The development and maintenance of anxiety symptoms from infancy through adolescence in a longitudinal sample. *Development and Psychopathology*. 2006;18:517-550.
38. Sanson A, Pedlow R, Cann W, Prior M, Oberklaid F. Shyness ratings: Stability and correlates in early childhood. *International Journal of Behavioral Development*. 1996;19(4):705-724.
39. Rapee RM, Kennedy S, Ingram M, Edwards SL, Sweeney L. Prevention and early intervention of anxiety disorders in inhibited preschool children. *Journal of Consulting and Clinical Psychology*. Jun 2005;73(3):488-497.

40. Rapee RM, Kennedy S, Ingram M, Edwards SL, Sweeney L. Altering the trajectory of anxiety in at-risk young children. . *American Journal of Psychiatry*. 2010;167:1518-1525.
41. Kagan J, Reznick JS, Gibbons J. Inhibited and uninhibited types of children. *Child Development*. 1989;60:838-845.
42. Kagan J, Snidman N, Arcus D, Reznick JS. *Galen's prophecy: Temperament in human nature*. New York: Basic Books; 1994.
43. Presley R, Martin RP. Toward a structure of preschool temperament: Factor structure of the Temperament Assessment Battery for Children. *Journal of Personality*. 1994;62(3):415-448.
44. Lovibond SH, Lovibond PF. The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy*. 1995;33:335-344.
45. Magana Amato A. Manual for coding expressed emotion from the five minute speech sample 1993, University of California at Los Angeles.
46. Magana AB, Goldstein MJ, Karno M, Miklowitz DJ, Jenkins J, Falloon IRH. A brief method for assessing expressed emotion in relatives of psychiatric patients. *Psychiatry Research*. 1986;17:203-212.
47. Hirshfeld DR, Biederman J, Brody L, Faraone SV. Associations between expressed emotion and child behavioral inhibition and psychopathology: A pilot study. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1997;36(2):205-213.
48. Raishevich N, Kennedy SM, Rapee RM. Expressed emotion displayed by the mothers of inhibited and uninhibited preschool-aged children. *Journal of Clinical Child and Adolescent Psychology*. 2010;39(2):187-194.

49. Silverman WK, Albano AM. *The Anxiety Disorders Interview Schedule for Children-IV (child and parent versions)*. San Antonio: Texas: Psychological Corporation; 1996.
50. Rapee RM. The preventative effects of a brief, early intervention for preschool-aged children at risk for internalising: Follow-up into middle adolescence. *Journal of Child Psychology and Psychiatry*, 54(7), 780-788.

Table 1: Proportion of Behaviorally Inhibited and Behaviorally Uninhibited Groups Meeting Diagnostic Criteria for Anxiety Disorders.

Diagnosis	Behaviorally Inhibited N = 57	Behaviorally Uninhibited N = 34
Separation Anxiety Disorder	3.5%	0%
Generalized Anxiety Disorder	31.6%	20.6%
Social Anxiety Disorder	36.8%	14.7%
Specific Phobia	21.1%	11.8%
Obsessive Compulsive Disorder	7.0%	0%
Any nonsocial Anxiety Disorder	40.4%	26.5%
Any Anxiety Disorder	54.4%	29.4%

Table 2: Pearson Correlations Between Key Variables Assessed at Both Baseline (Age 4) and Age 15.

	Maternal trait anxiety	Maternal trait stress	Maternal report of child inhibition (age 4)	Laboratory observation of child inhibition (age 4)	Maternal critical comments	Maternal overinvolvement
Existence of social anxiety disorder (age 15)	.26*	.32**	.28*	.26*	.19	.13
Existence of non-social anxiety disorder (age 15)	.24*	.30**	.14	.13	.10	.03
Maternal trait stress	.73**					
Maternal report of child inhibition (age 4)	.01	.09				
Laboratory observation of child inhibition (age 4)	.02	.01	.73**			
Maternal critical comments	.19	.12	.09	.12		
Maternal overinvolvement	.00	.12	.32*	.10	.15	

* $p < .05$; ** $p < .01$

Table 3: Differences Between the Behaviorally Inhibited (BI) and Behaviorally Uninhibited (BUI) Groups on Other Key Variables at Age 4.

	BI	BUI	t and p values
Maternal reported inhibition	46.28 (6.41)	15.77 (8.28)	-18.59, $p < .001$
Laboratory observation score	0.31 (.31)	-0.50 (.45)	-9.81, $p < .001$
Maternal anxiety	3.04 (3.64)	3.33 (4.25)	0.33, $p = .744$
Maternal stress	8.44 (7.05)	7.35 (6.70)	-0.69, $p = .50$
Maternal critical comments	0.24 (.49)	0.18 (.40)	-0.52, $p = .60$
Emotional overinvolvement	0.37 (.49)	0.11 (.32)	-2.39, $p = .02$

Figure 1: Prediction of anxiety diagnoses at age 15 from latent variables at age 4.

ACCEPTED MANUSCRIPT

