

Stable Early Maternal Report of Behavioral Inhibition Predicts Lifetime Social Anxiety Disorder in Adolescence

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ABSTRACT

Objective: Behavioral inhibition (BI), a temperamental style identifiable in early childhood, is considered a risk factor for the development of anxiety disorders, particularly social anxiety disorder (SAD). However, few studies examining this question have evaluated the stability of BI across multiple developmental time points and followed participants into adolescence—the developmental period during which risk for SAD onset is at its peak. The current study used a prospective longitudinal design to determine whether stable early BI predicted the presence of psychiatric disorders and continuous levels of social anxiety in adolescents. It was hypothesized that stable BI would predict the presence of adolescent psychiatric diagnoses, specifically SAD. **Method:** Participants included 126 adolescents aged 14 to 16 years who were first recruited at 4 months of age from hospital birth records. Temperament was measured at multiple time points between the ages of 14 months and 7 years. In adolescence, diagnostic interviews were conducted with parents and adolescents, and continuous measures of adolescent- and parent-reported social anxiety were collected. **Results:** Stable maternal-reported early BI was associated with 3.79 times increased odds of a lifetime SAD diagnosis, but not other diagnoses, during adolescence (95% confidence interval 1.18–12.12). Stable maternal-reported early BI also predicted independent adolescent and parent ratings of ongoing social anxiety symptoms. **Conclusions:** Findings suggesting that stable maternal-reported early BI predicts lifetime SAD have important implications for the early identification and prevention of SAD. *J. Am. Acad. Child Adolesc. Psychiatry*, 2009;48(9):928–935. **Key Words:** temperament, behavioral inhibition, social anxiety disorder.

Approximately 15% to 20% of children can be classified as behaviorally inhibited during early childhood. This temperamental style involves the tendency to show signs

of fear, reticence, or wariness in response to unfamiliar situations and to withdraw from unfamiliar peers.^{1,2} Approximately half of all children categorized as extremely behaviorally inhibited continue to show signs of wariness across childhood.³ Children showing consistent behavioral inhibition (BI) are characterized by greater autonomic reactivity,⁴ elevated morning cortisol levels,⁵ heightened startle responses,⁶ and more vigilant attention styles.⁷ As well, adolescents or young adults who were characterized in childhood with BI were found, using functional imaging studies, to show heightened amygdala activation to novel neutral faces⁸ or to threatening emotion faces,⁹ findings similar to those documented in patients with anxiety disorders. Together, these findings suggest that BI may be a possible risk factor for anxiety disorders.¹⁰ Although accumulating findings do support this possibility,^{11,12} few

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studies have evaluated the stability of early BI across multiple developmental time points and followed participants into the period of greatest risk for social anxiety using comprehensive diagnostic assessment protocols.

A number of studies examining the association between early BI and anxiety psychopathology have used cross-sectional designs,¹³ retrospective measures of early temperament,^{14–16} and/or questionnaire data assessing anxiety problems or personality traits.^{17,18} For instance, Biederman and colleagues¹³ reported increased risk for social anxiety disorder (SAD) among 2- to 6-year-old offspring of parents with panic disorder who were concurrently classified as high BI. In a mixed sample of high-risk and unselected children, children classified as high BI were at increased risk for concurrent multiple anxiety disorders, overanxious disorder, and phobias.^{19,20} Seventy-six of these children were reassessed at 3-year follow-up; children initially classified as high and low BI differed in rates of multiple psychiatric diagnoses, multiple anxiety disorders, avoidant disorder, separation anxiety, and agoraphobia.²¹ Similarly, Hirshfeld-Becker and colleagues²² reported on a mixed sample of children assessed for BI once between the ages of 21 months and 6 years who were reevaluated with the Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS) parent and child interviews 5 years later (mean age 9.6 years). In this sample, BI specifically predicted the onset of SAD (odds ratio 2.37; 95% confidence interval 1.10–5.10) within the at-risk group; however, these findings were limited to children at risk for anxiety by virtue of parental anxiety and mood disorders. The extent to which these results generalize to an unselected sample have yet to be established.

Data bearing most directly on risk for anxiety disorders among individuals with early BI emerge from prospective longitudinal studies. Three prospective longitudinal studies followed samples into adolescence or adulthood. Schwartz and colleagues²³ found a specific association between age-2 BI and lifetime SAD assessed during adolescence; however, when impairment was required for diagnosis, this finding held only for girls. Moreover, interviews with parents were not conducted, an approach which calls into question the validity of lifetime diagnoses.^{24,25} Prior and colleagues¹² conducted psychiatric assessments with a subset of their epidemiological sample ($n = 59$) at ages 13 to 14 years and found that adolescents meeting current criteria for anx-

ety disorders did not evidence extreme or stable shy/inhibited temperament (based on maternal report) in earlier assessments. Finally, Caspi and colleagues²⁶ reported that participants characterized by extreme low or high BI at age 3 years were at increased risk for multiple current psychiatric disorders, particularly depression, at age 21 years; however, they found no specific association between early BI and adult anxiety. Existing studies therefore provide mixed support for the relations between early BI and anxiety disorders during adolescence and adulthood. Furthermore, of these studies, only Prior and colleagues^{12,27,28} reported multiple early assessments of BI and no strong evidence emerged of relations between early shyness and current anxiety diagnoses in adolescence.

In understanding the link between early temperament and later psychopathology, it is important to consider that BI is only moderately stable across development.³ Perez-Edgar and Fox¹⁰ reported stability over 1 to 6 years ranging from 0.24 to 0.64, with greater stability among extreme groups. However, there is also a great deal of temporal variability in BI. For instance, Kagan and Snidman¹⁷ reported that only 18% of inhibited infants were classified as inhibited at every laboratory evaluation from 1 to 7 years of age. Individuals with stable BI may represent a distinct subgroup with a biological or genetic predisposition to negatively react to novel situations. Indeed, findings from a small study suggested that children who consistently fell into the high BI group at 21 months, 4 years, 5.5 years, and 7.5 years had higher rates of anxiety disorders at age 7.5 years than those who were not consistently inhibited at each of these time points.²⁹ We therefore hypothesized that it is stable BI, rather than BI measured at a single time point, which places individuals at increased risk for developing anxiety disorders.

The current study examines the degree to which stable BI, measured at four time points from infancy through childhood using maternal reports and/or behavioral observations, predicts anxiety disorders in adolescence. In adolescence, we conducted semistructured diagnostic interviews with the parent and adolescent to assess a broad range of *DSM-IV* psychiatric disorders, as well as a continuous measure of adolescent- and parent-reported social anxiety symptoms. Of note, these three measures were completed independently to generate three independent sources of information about social anxiety symptoms.

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