

Lack of Association Between Parental Alcohol or Drug Addiction and Behavioral Inhibition in Children

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Objective: “Behavioral inhibition to the unfamiliar” has been proposed as a precursor to anxiety. A recent study proposed that it may also be a precursor to alcoholism. The authors sought to replicate the latter finding through a secondary analysis of data from a large study of young children (age 2–6 years)—offspring of parents with panic and depressive disor-

ders—who had been assessed for behavioral inhibition through laboratory-based observations.

Method: The offspring were stratified on the basis of presence or absence of parental lifetime history of DSM-III-R alcohol dependence (N=115 versus N=166, respectively) or drug dependence (N=78 versus N=203). The rates of behavioral inhibition were then compared between groups.

Results: Despite adequate power to detect associations, neither parental alcohol dependence nor drug dependence was associated with a higher risk for behavioral inhibition in the offspring.

Conclusions: These results are not consistent with the hypothesis linking behavioral inhibition to addictions.

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“**B**ehavioral inhibition to the unfamiliar,” the temperamental tendency to exhibit restraint and reticence in unfamiliar situations, has been proposed as a precursor to anxiety disorders (1, 2). We previously found higher rates of behavioral inhibition among children of panic patients (1) and confirmed associations between behavioral inhibition and panic disorder with comorbid major depression (3).

In the latter study, behavioral inhibition was as prevalent in children at risk for major depression as in those at risk for panic disorder, raising the possibility that behavioral inhibition may confer general vulnerability for varied disorders. Consistent with this idea, Hill et al. (4) found that behavioral inhibition was overrepresented in children at risk for alcohol dependence. They concluded that behavioral inhibition may be a risk factor for alcohol dependence.

Understanding the links between behavioral inhibition and addictions might clarify associations between anxiety and substance use disorders, thus informing preventive interventions. Since anxiety and depressive disorders can be associated with addictions (5), putative connections between behavioral inhibition and addictions need to consider the possible confounds of panic disorder and major depression. To examine these issues, we conducted a secondary analysis of data from our study of behavioral inhibition in offspring of parents with panic disorder and major depression (3), stratifying children on the basis of parental history of alcohol or substance dependence.

Method

Details of the study design have been previously published (3). Subjects were children (age 2–6 years) of parents with lifetime diagnoses of major depression or panic disorder either with or without comorbid major depression or of a comparison group of

parents without mood or anxiety disorders. Panic disorder and major depression parents were recruited from clinical referrals and advertising. Comparison parents were recruited from hospital and community advertisements; they were included only if both parents did not meet DSM-III-R criteria for panic disorder, generalized anxiety disorder, agoraphobia, social phobia, obsessive-compulsive disorder, major depression, bipolar disorder, or dysthymia. The study was approved by our institutional review board. Parents provided informed consent for themselves and their children. Children assented to study procedures.

Parents were interviewed with the Structured Clinical Interview for DSM-III-R (SCID) (6) by interviewers blind to ascertainment group and to all information about the children. Social class was assessed with the Hollingshead Four-Factor Index (7). On the basis of 173 audiotaped interviews, good agreement was seen between study interviewers and board-certified psychiatrists for diagnoses of major depression ($\kappa=0.86$), panic disorder ($\kappa=0.96$), drug dependence ($\kappa=0.92$), and alcohol dependence ($\kappa=0.89$).

Behavioral inhibition in the children was assessed blind to parental diagnosis following a 90-minute observed interaction with an unfamiliar examiner and was defined by means of three methods (3). First, the dichotomous definition of behavioral inhibition was assessed by using age-specific indices (3). Two-year-olds were considered inhibited if they exhibited four or more fear responses or were rated as demonstrating minimal vocalization or smiling. Four- and 6-year-old children were considered inhibited if they made fewer spontaneous comments and smiles than the lowest 20th percentile of comparison children. High intraclass correlations were seen for smiles ($\kappa=0.96$) and comments ($\kappa=0.997$).

Second, the global definition of behavioral inhibition was measured in 4- and 6-year-olds by means of a 4-point rating of the child’s overall behavior during the 90-minute observed interaction (reliability of 4-point ratings: $\kappa=0.70$). Children with ratings of 3 or 4 were considered inhibited. Last, a summary definition of behavioral inhibition was derived from a principal-factors factor analysis with varimax rotation of all behavioral variables. Children who had factor scores in the upper 20th percentile of

their age range were classified as inhibited. Because we included multiple siblings per family, we used generalized estimating equations to account for dependence among relatives. We modeled behavioral inhibition as a function of parental alcohol or drug dependence.

Results

Information on parental substance use disorders was available for 281 children: 115 had parents who met criteria for lifetime alcohol dependence (three with panic disorder, 27 with major depression, 65 with panic disorder plus major depression, and 20 comparison parents), and 78 had parents who met criteria for lifetime drug dependence (five with panic disorder, 19 with major depression, 44 with panic disorder plus major depression, and 10 comparison parents). Therefore our power to detect a difference in behavioral inhibition rates comparable to that found in our prior report (3) (i.e., 29% versus 12% for offspring of panic disorder plus major depression parents and comparison parents, respectively) was 92% for offspring of parents with alcohol dependence and 87% for offspring of parents with drug dependence.

Children in the study group were 2 (19%, $N=52$), 4 (54%, $N=153$), or 6 (27%, $N=76$) years old and were mainly Caucasian (93%, $N=260$) from intact families (86%, $N=241$); 44% ($N=125$) of the children were female. Because social class was significantly lower among those whose parents had a history of alcohol dependence (mean=2.4 [$SD=1.0$] versus mean=1.8 [$SD=0.9$] for those without such a history; $t=-5.26$, $df=279$, $p<0.001$) and drug dependence (mean=2.5 [$SD=1.0$] versus mean=1.9 [$SD=0.9$]; $t=-4.09$, $df=279$, $p<0.001$)—as well as significantly associated with behavioral inhibition (3)—we covaried social class in all analyses.

No differences were detected in the rate of behavioral inhibition between children of parents with and without alcohol dependence for any of the three definitions (dichotomous: 24% [$N=28$ of 115] versus 22% [$N=36$ of 166], respectively [$z=-0.15$, $p=0.87$]; global: 44% [$N=43$ of 98] versus 34% [$N=45$ of 131] [$z=0.92$, $p=0.34$]; summary: 35% [$N=40$ of 115] versus 29% [$N=48$ of 166] [$z=0.48$, $p=0.63$]). There were also no differences in rates of behavioral inhibition between children of parents with and without drug dependence (dichotomous: 26% [$N=20$ of 78] versus 22% [$N=44$ of 203] [$z=0.22$, $p=0.82$]; global: 40% [$N=25$ of 63] versus 38% [$N=63$ of 166] [$z=-0.18$, $p=0.86$]; summary: 35% [$N=27$ of 78] versus 30% [$N=61$ of 203] [$z=0.27$, $p=0.78$]). Separate analyses among offspring of parents with panic disorder and/or major depression and among offspring of parents with no disorder yielded no significant association between behavioral inhibition and parental alcohol or drug dependence.

Discussion

Unlike Hill et al. (4), we found no association between parental substance dependence and behavioral inhibition

in offspring. These negative findings contrast with many reports documenting associations between behavioral inhibition and parental panic disorder (1–3) or major depression (8). Taken together these findings support the hypothesis that the association between behavioral inhibition and parental psychopathology may be limited to anxiety and depression.

Because substance use disorders and behavioral inhibition are each associated with anxiety and mood disorders (5), the lack of association between behavioral inhibition and substance use disorders is counterintuitive. It may reflect etiologic heterogeneity, since it is possible that some forms of anxiety and mood disorders are associated with substance use disorders and others with behavioral inhibition.

Our study was limited in that we assessed associations with lifetime, not current, substance use disorders. However, the rates of current alcohol (9%) and drug (11%) dependence among affected parents were too low to meaningfully assess associations with behavioral inhibition. For that reason, we also could not confirm diagnoses with toxicology screening analyses.

Our failure to replicate Hill et al. (4) may stem from methodological differences. Those investigators assessed children from multigenerational families affected with alcoholism, whereas we studied children whose parents had been ascertained through diagnoses of panic disorder or major depression. The assessment of behavioral inhibition in our study relied on a single laboratory assessment, whereas Hill et al. relied on multiple peer assessments. Since the parents with alcoholism in the study of Hill et al. had no greater risk for anxiety disorders or depression, they were most similar to our comparison group of parents with no panic disorder or major depression. However, even among the offspring of our comparison parents, there was no association between parental alcoholism and behavioral inhibition. Further follow-up of our study group will discover whether behavioral inhibition confers vulnerability to addictions as the children mature into adolescence.

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