JOURNAL OF CHILD AND ADOLESCENT PSYCHOPHARMACOLOGY
Volume 18, Number 6, 2008

Pp. 589–593
DOI: 10.1089/cap.2007.142

Temperament in Child Offspring of Parents with Bipolar Disorder

Manpreet K. Singh,[1,2] M.D., Melissa P. DelBello, M.D.,[1] and Stephen M. Strakowski, M.D.[1]

Abstract

Objective: The aim of this study was to examine the relationship between temperament and psychopathology in child offspring of parents with bipolar disorder.
Method: The Dimensions of Temperament–Revised (DOTS-R) and the Washington University in St. Louis Kiddie Schedule for Affective Disorders and Schizophrenia (WASH U K-SADS) were used to assess temperament and psychopathology, respectively in offspring (8–18 years) of parents with bipolar I disorder (OBP, $n = 31$) and demographically similar healthy offspring of parents without any *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV) diagnosis (OHC, $n = 21$).
Results: Compared to OHC, OBP had increased Activity Level–General scores (effect size, $d = -0.78$), and a trend for decreased Task Orientation ($d = -0.78$). OBP with mood disorders had trends for decreased Approach ($d = 0.89$), Flexibility–Rigidity ($d = 1.01$), Rhythmicity–Sleep ($d = 0.79$), and Task Orientation ($d = 0.89$) as compared to OBP without mood disorders. OBP with attention-deficit/hyperactivity disorder (ADHD) showed a trend for decreased Task Orientation scores compared with those without ADHD ($d = 0.82$).
Conclusion: Although limited by parent report, specific temperaments may be important in characterizing offspring of parents with bipolar disorder. Longitudinal studies to determine if certain temperaments inform treatment response and prognosis in this population are needed.

Introduction

Biopsychosocial formulations often include predisposing, precipitating, perpetuating, and protective factors for psychiatric disorders (Engel 1980). Temperament encompasses all of these components, and so may be useful to identify the origins and etiologies of mood disorders. Specific temperament traits have been proposed to predict (Chang et al. 2003; Kochman et al. 2005), predispose (Akiskal and Akiskal 2005), perpetuate (Hirshfeld-Becker et al. 2007), and protect (Evans et al. 2005) individuals from ensuing mood disorders. Although many studies have explored a theoretical basis for affective temperament in bipolar disorder (Akiskal and Akiskal 2005) and in those with a familial risk for developing bipolar disorder (Chiaroni et al. 2005), few have studied the temperament of child offspring of adults with bipolar disorder (OBP). Examining temperament in offspring of parents with bipolar disorder may be essential to provide clinicians with features of temperament that may facilitate, interfere with, or be the target for psychosocial interventions that are being developed for youths with and at risk for developing bipolar disorder (Miklowitz 2006). In addition to serving as a potential vulnerability indicator, the strong genetic component and stability of temperament over time may provide insights to the neurobiology of bipolar illness (Rothbart et al. 1994; McCrae et al. 2000).

To our knowledge, there have been only two prior studies examining temperament in children who are offspring of adults with bipolar I or II disorder (Chang et al. 2003; Duffy et al. 2007). The first demonstrated that bipolar offspring with psychiatric disorders had decreased flexibility, decreased ability to demonstrate persistence on tasks with-

[1]Department of Psychiatry, Division of Bipolar Disorders Research, University of Cincinnati, and [2]Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio.

This study was supported by the Stanley Medical Research Institute.

This work was presented in part at the International Conference of Bipolar Disorders in Pittsburg, Pennsylvania, June, 2007, and at the American Academy of Child and Adolescent Psychiatry Annual Meeting, Boston, Massachusetts, October, 2007 (New Research Poster, F28).

out distraction, and negative moods as compared to bipolar offspring without psychopathology (Chang et al. 2003). However, there was no comparison group of healthy offspring in that study. More recently, a study comparing offspring of parents with bipolar disorder to offspring of healthy parents confirmed a positive correlation between temperament and lifetime psychopathology (Duffy et al. 2007). Specifically, emotionality, or high emotions with an easy tendency to cry and react intensively when upset, as defined by the self-reported Emotionality, Activity, Sociability and Shyness Temperament Questionnaire, was positively associated with the risk of having a mood disorder (Duffy et al. 2007).

With these considerations in mind, the primary aim of this study was to compare the temperaments of OBP and demographically similar and psychiatrically unaffected offspring of healthy parents (OHC). On the basis of prior investigations, we hypothesized that compared to OHC, OBP would have distinct temperament profiles, including decreased flexibility and task orientation, along with negative moods. As a secondary aim, we also explored associations between temperament and presence of psychopathology within the OBP group.

Methods

Subjects

Children (ages 8–18 years) of parents with bipolar I disorder (OBP, $n = 31$) were recruited from the University of Cincinnati Stanley Foundation Naturalistic Follow-up Study of Bipolar Disorder, a National Institute of Mental Health (NIMH)-funded naturalistic outcome study of bipolar patients and from local bipolar support groups. Control children of parents without any *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV) (American Psychiatric Association 1994) Axis I disorder comparable in age, sex, and ethnicity, were recruited for study participation from community advertisements and local schools (OHC, $n = 21$). Children were excluded from the OHC group if they had any DSM-IV Axis I psychiatric disorder. After complete description of the study to the potential subjects and their parents, written informed consent was obtained from the parent and written assent was obtained from the child. This study was approved by the University of Cincinnati and the Children's Hospital Medical Center Institutional Review Boards.

Diagnostic assessments

Parental diagnoses were made using the Structured Clinical Interview for DSM-IV–Patient edition (SCID-P) (First et al. 1996), performed by psychiatrists with established interrater diagnostic reliability ($\kappa > 0.90$). The Washington University in St. Louis Kiddie Schedule for Affective Disorders and Schizophrenia (WASH U K-SADS) was administered to children (OBP) who had at least one parent with bipolar I disorder and children of healthy parents, by raters who were blind to diagnostic category (Singh et al. 2007). Symptom severity was assessed by the Young Mania Rating Scale (YMRS) (Young et al. 1978) (interrater intraclass correlation [ICC] > 0.90), and the self-reported Inventory of Depression Scale (IDS) (Rush et al. 1986).

Assessment of temperament

The self-report instrument Dimensions of Temperament–Revised (DOTS-R) (Windle and Lerner 1986) was used to assess temperament in OBP and OHC groups (overall $\kappa = 0.54$–0.81 in elementary school children). One parent, self-identified as the primary caregiver, in each family completed the DOTS-R for their offspring. In most (90%) of the OBP families, the parent with bipolar disorder responded to the questionnaire. However, they were euthymic (i.e., not experiencing a mood episode) at the time they completed the DOTS-R as established by the SCID-P. Parents answered 54 items that assessed the following nine temperament characteristics on a continuous scale: Activity Level–General (greater scores indicate higher levels of energy and motor activity), Activity Level–Sleep (greater scores indicate higher motor activity during sleep), Flexibility–Rigidity (greater scores indicate greater ability to adapt to new situations), Approach–Withdrawal (greater scores indicate a greater tendency to approach new situations, things, or people), Rhythmicity–Sleep (greater scores indicate greater ability follow the same daily sleeping patterns), Rhythmicity–Eating (greater scores indicate greater ability to follow the same daily eating patterns), Rhythmicity–Daily Habits (greater scores indicate greater regularity in daily timing of habits such as toileting, and consistent peaks and dips in energy levels), Task Orientation (greater scores indicate greater persistence on tasks without easy distraction), and Mood (greater scores indicate consistently greater good moods and affect).

Statistical analyses

All statistical analyses were performed using Statistical Analysis System software, version 9.1.3 (SAS Institute, Cary, N.C.). Wilcoxon rank sum and Fisher exact tests were used to compare demographic variables between groups. Two sample *t*-tests were used to compare mean DOTS-R, YMRS, and IDS scores among OBP and OHC subjects. An α-value of 0.006 (two-tailed) was chosen as the Bonferroni-corrected significance threshold to adjust for multiple comparisons in nine subscales. Effect size was calculated for comparisons of differences in mean scores in OBP versus OHC using the equation $d = \mathrm{M1} - \mathrm{M2}/\mathrm{spooled}$ where d = effect size, M1 − M2 is the difference between the two groups' mean values, and spooled = the pooled standard deviations (SD) of the two groups, and for two correlated means using the equation $d = r/\sqrt{(1 - r^2)}$, where r = correlation coefficient (Cohen 1977). An effect size of $d > 0.5$ is considered a medium effect. Equality of variance in DOTS-R subscale scores across groups was measured by Levene's test of homogeneity (Levene 1960). *t*-Tests were also used to make within-group comparisons of DOTS-R scores based on the presence or absence of psychopathology as well as on the presence or absence of a mood disorder or attention-deficit/hyperactivity disorder (ADHD) in the OBP group. Pearson correlations were also used to explore the within-group relationships between temperament and manic and depressive symptom severity, as assessed by the DOTS-R subscale scores, the YMRS, and the IDS, respectively. Finally, single sample *z*-score test statistics were used to compare mean DOTS-R subscale scores of OBP and OHC with normative DOTS-R data.

Results

There were no statistically significant group differences between OBP ($n = 31$) and OHC ($n = 21$) participants in age (mean years = 9.9 ± 2.4 vs. 10.1 ± 1.5, $p = 0.50$) or sex (female, 48% vs. 38%, Fisher's exact test, $p = 0.57$). There were more White subjects in the OBP group than in the OHC group (94% vs. 71%, Fisher exact test, $p = 0.05$), but our results were unchanged after analyses were adjusted for ethnicity (unadjusted results are reported). Twenty six (84%) of the OBP had at least one DSM-IV Axis I disorder; 19 (61%) OBP had at least one mood disorder, including dysthymia ($n = 5$), major depressive disorder ($n = 4$), bipolar I disorder ($n = 5$), bipolar II disorder ($n = 4$), cyclothymia ($n = 2$), and bipolar disorder not otherwise specified ($n = 1$); 12 (39%) OBP had a diagnosis of ADHD; and 7 (23%) OBP had co-occurring bipolar disorder and ADHD.

Compared with OHC, OBP had a significantly increased mean Activity Level–General score ($t = 2.97$, df = 50, $p = 0.005$, $d = -0.78$), and a trend for a decreased mean Task Orientation score ($t = -2.68$, df = 50, $p = 0.01$, $d = -0.78$) (Table 1). There is significantly greater variability in the OBP group on the Activity–General (Levene test of homogeneity of variances, $F(1,50) = 7.97$, $p = 0.0068$) and Mood subscales (Levene test of homogeneity of variances, $F(1,50) = 8.05$, $p = 0.0066$) than the OHC group. In addition, OBP without a mood disorder showed trends for significantly higher subscale scores in Approach ($t = 2.44$, df = 29, $p = 0.02$, $d = 0.89$), Flexibility–Rigidity ($t = 2.73$, df = 29, $p = 0.01$, $d = 1.01$), Rhythmicity–Sleep ($t = 2.15$, df = 29, $p = 0.04$, $d = 0.79$), and Task Orientation ($t = 2.31$, df = 29, p = 0.03, $d = 0.89$) as compared to OBP with a mood disorder. Trends for increased mean Task Orientation scores were also found in OBP without ADHD versus with ADHD ($t = 2.25$, df = 29, $p = 0.03$, $d = 0.82$).

YMRS and IDS scores were significantly higher in the OBP versus OHC group [OBP, mean (SD) = 4.1(5.5) versus OHC = 0.57(1.1), $t = 3.48$, df = 49, $p < 0.002$ and OBP, mean (SD)=5.9(7) versus OHC = 2.1(5), $t = 2.21$, df = 49, $p = 0.03$, respectively]. Within OBP, more severe mania symptoms were significantly correlated with Flexibility–Rigidity ($r = -0.46$, $p = 0.01$, $d = 0.52$), Activity Level–General ($r = 0.64$, $p = 0.0001$, $d = 0.83$), Activity–Sleep ($r = 0.56$, $p = 0.001$, $d = 0.68$), Rhythmicity–Sleep ($r = -0.45$, $p = 0.01$, $d = 0.50$), and Task Orientation ($r = -0.54$, $p < 0.002$, $d = 0.64$) subscale scores. There were 4 subjects among the OBP with a YMRS score of 10 or greater. IDS scores were significantly correlated with Mood ($r = -0.66$, $p < 0.0001$, $d = 0.88$) within the OBP group. There were no significant correlations within the OHC group between DOTS-R subscale scores and YMRS (highest $r = 0.40$, $p = 0.07$, $d = 0.44$ for Rhythmicity–Eating) or IDS (highest $r = 0.34$, $p = 0.13$, $d = 0.36$) scores.

DOTS-R normative data (Windle 1992) are sampled from 972 families across the United States and did not exclude families by the presence of parental or child psychiatric illness. We compared these normative data with our OBP sample (Table 1). Our OBP group reported lower Activity Level–General ($Z = -2.63$, $p = 0.009$) and Rhythmicity–Daily Habits ($Z = -5.61$, $p < 0.0001$) scores, and higher Rhythmicity–Sleep ($Z = 3.85$, $p = 0.0001$) scores than the US normative control group. We also compared the DOTS-R normative data with our OHC group. Our sample of OHC reported lower Activity Level–General ($Z = -5.85$, $p < 0.0001$) and Activity Level–Sleep ($Z = -3.64$, $p < 0.0003$) scores, and higher Task Orientation ($Z = 2.93$, $p < 0.003$), Rhythmicity–Sleep ($Z = 4.13$, $p < 0.0001$), and Rhythmicity–Eating ($Z = 3.13$, $p < 0.002$) subscale scores than the U.S. normative control group.

Discussion

Our findings suggest that offspring of parents with bipolar disorder exhibit distinct temperamental traits as compared to healthy offspring of psychiatrically well parents. Specifically, OBP exhibited increased energy and motor activity as compared to the OHC group and trends for de-

TABLE 1. MEAN COMPARISONS OF DOTS-R SCORES: OFFSPRING OF PARENTS WITH BIPOLAR DISORDER, HEALTHY OFFSPRING OF HEALTHY PARENTS, AND OFFSPRING OF GENERAL POPULATION

DOTS-R subscale mean (SD)	*OBP* n = *31*	*OHC* n = *21*	*Population mean*	*Chang 2003 cohort*
Activity–General[a]	17.2 (5.1)	13.5 (3.0)	19.4 (4.6)	17.7 (6.0)
Activity–Sleep	9.5 (4.2)	8.1 (3.4)	11.0 (3.6)	10.9 (3.7)
Approach–Withdrawal	19.9 (4.4)	20.6 (3.3)	19.8 (3.5)	20.9 (3.8)
Flexibility–Rigidity	14.5 (3.5)	16.3 (3.0)	14.8 (2.7)	14.1 (3.7)
Mood	22.0 (5.2)	24.3 (2.9)	23.9 (4.2)	22.8 (4.9)
Task Orientation[b]	19.4 (4.8)	22.9 (4.2)	19.6 (5.1)	18.3 (5.6)
Rhythm–Sleep[c]	17.3 (3.5)	18.0 (3.3)	14.8 (3.6)	15.9 (4.2)
Rhythm–Eating	14.8 (3.5)	15.9 (3.9)	13.4 (3.6)	14.3 (4.3)
Rhythm–Daily habits[d]	13.2 (2.9)	13.3 (2.7)	12.3 (2.7)	12.3 (3.3)

[a]OBP vs. OHC: $t(50) = 2.97$, $p = 0.0045$, $d = 0.88$; OBP vs. Population: $Z = -2.63$, $p = 0.009$, 95% CI = {15.61, 18.85}, $d = 0.45$.
[b]OBP vs. OHC: $t(50) = -2.68$, $p = 0.01$, $d = 0.78$.
[c]OBP vs. Population: $Z = 3.85$, $p = 0.0001$, 95% CI = {16.02, 18.56}, $d = 0.70$.
[d]OBP vs. Population: $Z = -5.61$, $p < 0.0001$, 95% CI = {8.63, 10.53}, $d = 0.32$.
OBP = Offspring of parents with bipolar disorder; OHC = healthy offspring of healthy parents; DOTS-R = Dimensions of Temperament–Revised; SD = standard deviation; CI = confidence interval.

creased persistence on tasks with easy distraction. Our preliminary findings also showed that OBP with a mood disorder had a decreased tendency to approach new situations, decreased flexibility, decreased ability to follow the same daily sleep patterns, and decreased persistence on tasks with easy distraction. OBP with ADHD displayed decreased persistence on tasks with easy distraction as compared to OBP without ADHD.

Greatest variability in scores was seen in the OBP group in Activity–General and Mood subscales, raising the possibility of state-dependent influences on temperament ratings. In addition, correlational analyses confirmed a relationship between temperament and symptoms of mania and depression within the OBP group, supporting data from prior studies that demonstrated a relationship between temperament and psychopathology (Chang et al. 2003; Duffy et al. 2007). Individual temperament traits could serve as potential targets for early identification and intervention of mood disorders in families with parents with bipolar disorder to delay or prevent the onset, severity, or progression of mood disorders in children with a positive family history of bipolar disorder. Moreover, certain characteristic temperaments might be related to parental expressivity (Valiente et al. 2006) and may be important to consider in certain preventative or family-focused interventions for bipolar families (Morris et al. 2007). Further studies to assess the effectiveness of specific therapeutic interventions in the context of these temperament characteristics among offspring of bipolar families are necessary.

These results are only partially consistent with those of Chang and colleagues (Chang et al. 2003), who found that relative to DOTS-R normative data, offspring of bipolar I and II parents had lower levels of energy and motor activity (Activity Level–General), and higher tendencies to approach new situations, things or people (Approach–Withdrawal), and higher predictability in daily sleeping patterns (Rhythmicity–Sleep). Offspring unaffected by a psychiatric diagnosis in Chang's study demonstrated these characteristics of temperament to an even greater degree as compared to affected individuals in the cohort, along with higher predictability in daily eating patterns (Rhythmicity–Eating). Routine surrounding sleeping and eating patterns in psychiatrically unaffected offspring in this study may represent an adaptation in families vulnerable to irregularities in sleeping and eating patterns due to psychopathology or due to lack of family cohesion (Romero et al. 2005). These results may be divergent from our findings because they were compared to U.S. population means rather than a matched healthy comparison group, or because assessments of temperament were obtained from adolescents and parents rather than parents alone.

When we compared our sample of bipolar families with U.S. normative data, our results are consistent with Chang and colleagues. However, our OBP group had a lower mean Activity Level–Sleep score, and overall higher scores on Task Orientation, and the Rhythmicity–Sleep, Rhythmicity–Eating, and Rhythmicity–Daily Habits subscales compared with individuals in Chang's study. Scores varied across all four groups in most subscales, which demonstrate differences not only among OBP and U.S. normative data, but also between our healthy OHC group and U.S. normative data. The latter can be explained by the possibility that the U.S. normative data contained individuals and parents with psychopathology. By contrast, our OHC group was "supernormal" from the standpoint of having no psychiatric illness present. As such, the U.S. population means reported by Windle et al. may not represent normative ranges but rather means drawn from a large sample in the U.S., which may have internal but not external validity. In addition, this result also suggests that there may be effects of different lifestyles, cultural norms, or other environmental factors across different regions in the United States that may be contributing significantly to the DOTS-R subscale scores.

There are several limitations of our study that need to be considered when interpreting the results of this study. First, this cross-sectional study is limited by its small sample size and parental retrospective report of temperament rather than subject self report or clinical assessment. Second, most of the OBP (90%) temperament characterizations were completed by the affected bipolar parent. However, parent ratings were completed during euthymia, and prior study has shown agreement between independent parent ratings and adolescent self-perceptions of temperament on all nine subscales of the DOTS-R, even in parent/child dyads that are frequently characterized by significant conflict (Luby and Steiner 1993). Third, only five OBP subjects did not have a DSM-IV Axis I psychiatric diagnosis at the time of assessment; many met criteria for more than one disorder, and certain subscales on the DOTS-R were correlated with each other, a diagnosis of a mood disorder, or ADHD. Consequently, it is difficult to discriminate if parents were validly using the DOTS-R to assess their child's temperament or their child's psychopathology.

To facilitate assessment of temperament over psychopathology, instructions given to parents completing the DOTS-R were framed with a general picture in mind and with a goal of assessing dimensions of behavior that are stable over time. Parents were encouraged to not spend too much time thinking over each question, to give the first natural answer that comes to mind, and not to report on just the latest disturbance in behavior or affect. Higher rates of psychopathology in the OBP than OHC might also reflect a referral bias, where parents with bipolar disorder may have been more likely to seek the study or agree to participate if their child was already manifesting problems. Conversely, lower rates of psychopathology in the OHC group might limit the generalizability of our results, but Activity–General and Activity–Sleep DOTS-R subscale scores below population means would refute the notion that OHC are "supernormal." Nevertheless, characterizing a child's temperament may provide trait-related or premorbid features of mood disorders that may independently impact the long-term prognosis and response to treatment for mood disorders in offspring of parents with bipolar disorder. Future longitudinal treatment studies monitoring these characteristics over time are warranted.

Conclusion

It is unknown whether offspring of parents with bipolar disorder have unique temperament profiles compared to offspring of nonpsychiatrically ill parents or the general population, or whether such a profile could be used to predict onset or progression of mania. To clarify these questions, we com-

pared parent-reported temperaments between offspring of bipolar and healthy parents. Compared with healthy offspring, offspring of parents with bipolar disorder had increased Activity Level–General scores (effect size, $d = -0.78$) and a trend for decreased Task Orientation ($d = -0.78$), suggesting that these characteristics of temperament may warrant further investigation. Further longitudinal studies across the lifespan are necessary to verify parental ratings in this study and to determine if these temperament traits may inform psychotherapeutic interventions. Longitudinal studies will also aid in determining the valid application of the DOTS-R scale to assess temperament in children and adolescents who are at risk for or have already-developed psychopathology.

Disclosures

Dr. Singh has no conflicts of interest or financial ties to report. Dr. DelBello is a consultant for AstraZeneca, Bristol-Myers Squibb, Eli Lilly, and Pfizer; on the speakers bureau for AstraZeneca, GlaxoSmithKline, Pfizer; and has received research support from Abbott Laboratories, AstraZeneca, Bristol-Myers Squibb, Eli Lilly, Janssen, Johnson and Johnson, Pfizer, and Shire. Dr. Strakowski is a consultant for Pfizer, Lilly, Solvay, and Tikvah; on the speakers bureau for AstraZeneca (ended in 2007), France foundation (CME company), I3CME (CME company), CME inc (CME company), and DiMedix (CME company); and has received research support from Eli Lilly, Janssen, Pfizer, Forrest, AstraZeneca, Bristol-Myers Squibb, Martek Biosciences, Nutrition 21, and Repligen.

References

Akiskal KK, Akiskal HS: The theoretical underpinnings of affective temperaments: Implications for evolutionary foundations of bipolar disorder and human nature. J Affect Disord 85:231–239, 2005.

American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV). Washington (DC), American Psychiatric Association, 1994.

Chang KD, Blasey CM, Ketter TA, Steiner H: Temperament characteristics of child and adolescent bipolar offspring. J Affect Disord 77:11–19, 2003.

Chiaroni P, Hantouche EG, Gouvernet J, Azorin JM, Akiskal HS: The cyclothymic temperament in healthy controls and familially at risk individuals for mood disorder: Endophenotype for genetic studies? J Affect Disord 85:135–145, 2005.

Cohen J: Statistical Power Analysis for the Behavioral Sciences. New York, Academic Press, 1977.

Duffy A, Alda M, Trinneer A, Demidenko N, Grof P, Goodyer IM: Temperament, life events, and psychopathology among the offspring of parents with bipolar disorder. Eur Child Adolesc Psychiatry 16:222–228, 2007.

Engel GL: The clinical application of the biopsychosocial model. Am J Psychiatry 137:535–544, 1980.

Evans L, Akiskal HS, Keck PE Jr, McElroy SL, Sadovnick AD, Remick RA, Kelsoe JR: Familiality of temperament in bipolar disorder: Support for a genetic spectrum. J Affect Disord 85:153–168, 2005.

First MB, Spitzer RL, Gibbon M, Williams JBW: Structured Clinical Interview for DSM-IV Axis I Disorders-Patient Version (SCID-P). State Psychiatric Institute, Biometric Research Department, New York, 1996.

Hirshfeld-Becker DR, Biederman J, Henin A, Faraone SV, Micco JA, van Grondelle A, Henry B, Rosenbaum JF: Clinical outcomes of laboratory-observed preschool behavioral disinhibition at five-year follow-up. Biol Psychiatry 62:565–572, 2007.

Kochman FJ, Hantouche EG, Ferrari P, Lancrenon S, Bayart D, Akiskal HS: Cyclothymic temperament as a prospective predictor of bipolarity and suicidality in children and adolescents with major depressive disorder. J Affect Disord 85:181–189, 2005.

Levene, H: Contributions to Probability and Statistics: Essays in Honor of Harold Hotelling, Edited by Olkin I. Stanford University Press, Stanford,CA, 1960, pp 278–292.

Luby JL, Steiner H: Concordance of parent-child temperament ratings in a clinical sample of adolescent girls. Child Psychiatry Hum Dev 23:297–305, 1993.

McCrae RR, Costa PT, Jr., Ostendorf F, Angleitner A, Hrebickova M, Avia MD, Sanz J, Sanchez-Bernardos ML, Kusdil ME, Woodfield R, Saunders PR, Smith PB. Nature over nurture: Temperament, personality, and life span development. J Pers Soc Psychol 78:173–186, 2000.

Miklowitz DJ: An update on the role of psychotherapy in the management of bipolar disorder. Curr Psychiatry Rep 8:498–503, 2006.

Morris CD, Miklowitz DJ, Waxmonsky JA: Family-focused treatment for bipolar disorder in adults and youth. J Clin Psychol 63:433–445, 2007.

Romero S, DelBello MP, Soutillo CA, Stanford K, Strakowski SM: Family environment in families with versus without parental bipolar disorder: A preliminary comparison study. Bipolar Disord 7:617–622, 2005.

Rothbart MK, Ahadi SA. Temperament and the development of personality. J Abnorm Psychol 103:55–66, 1994.

Rush AJ, Giles DE, Schlesser MA, Fulton CL, Weissenburger J, Burns C: The Inventory for Depressive Symptomatology (IDS): Preliminary findings. Psychiatry Res 18:65–87, 1986.

Singh MK, DelBello MP, Soutullo C, Stanford KE, McDonough-Ryan P, Strakowski SM: Obstetrical complications in children at high risk for bipolar disorder. J Psychiatr Res 41:680–685, 2007.

Valiente C, Eisenberg N, Spinrad TL, Reiser M, Cumberland A, Losoya SH, Liew J: Relations among mothers' expressivity, children's effortful control, and their problem behaviors: A four-year longitudinal study. Emotion 6:459–472, 2006.

Windle M: Revised Dimensions of Temperament Survey (DOTS-R): Simultaneous group confirmatory factor analysis for adolescent gender groups. Psychol Assess 4:228–234, 1992.

Windle M, Lerner RM: Reassessing the dimensions of temperament individuality across the life span: The Revised Dimensions of Temperament Survey(DOTS-R). J Adolesc Res 1:213–230, 1986.

Young RC, Biggs JT, Ziegler VE, Meyer DA: A rating scale for mania: Reliability, validity, and sensitivity. Br J Psychiatry 133:429–435, 1978.

Address reprint requests to:
Melissa P. DelBello, M.D.
Associate Professor of Psychiatry and Pediatrics
Department of Psychiatry
University of Cincinnati College of Medicine
231 Albert Sabin Way
PO Box 670559
Cincinnati, OH 45267-0559

E-mail: delbelmp@email.uc.edu