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Risk for Suicidal Ideation Among the Offspring of Bipolar Parents: Results from the Bipolar Offspring Study (BIOS)

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Abstract

Objectives—To examine rates and identify risk factors for suicidal ideation among offspring of parents with bipolar disorder.

Methods—Subjects included 388 offspring of parents with bipolar disorder and 250 offspring of matched community controls enrolled in the Pittsburgh Bipolar Offspring Study (BIOS).

Results—Offspring of bipolar probands displayed greater rates of lifetime suicidal ideation than offspring of controls (33% versus 20%). Factors most strongly associated with lifetime suicidal ideation in offspring of bipolar parents included offspring mood disorder, hostility, recent sexual abuse, and family conflict.

Conclusions—Offspring of parents with bipolar disorder are at elevated risk for suicidal ideation as compared with offspring of controls. Suicide risk assessment in this population should attend to specific risk factors identified.

Keywords

bipolar disorder; offspring; suicidal ideation; high risk

Introduction

Risk for completed suicide in bipolar disorder (BP) is among the highest of all psychiatric disorders (Baldessarini & Tondo, 2003); between 25–50% of adult patients with BP make at least one suicide attempt in their lifetime, and between 8 and 19% of patients with BP will die from suicide (Goodwin & Jamison, 2007).

The offspring of parents with BP are at particularly high risk for suicide as a result of multiple biological, psychological and environmental risk factors. Primarily, BP is highly genetic, and therefore children of BP parents inherit a biological diathesis for the development of mood disorder (Birmaher et al., 2009)—one of the most potent risk factors for suicidal behavior (Bridge et al., 2006). Furthermore, individuals with a first-degree relative with BP demonstrate elevated rates of early illness onset (Schulze et al., 2006), a

factor strongly associated with increased risk for suicidal behavior (Lin et al., 2006; Slama et al., 2004). In fact, as compared with offspring of depressed mothers, offspring of mothers with BP experience earlier onset of suicidal ideation (SI) and a more severe course of suicidal risk; offspring of BP mothers who experience early-onset mood disorder themselves experience particularly acute SI (Klimes-Dougan et al., 1999; 1999). Findings also indicate that environmental factors documented to occur at elevated rates among offspring of parents with BP, including exposure to suicidal behavior (Spirito et al., 1989), physical and/or sexual abuse (Carballo et al., 2008), and stressful home environments (Wagner, 1997) further contribute to increased suicide risk in this population. Clearly, increased suicide risk among offspring of parents with BP results from varied developmental risk processes, leading experts in the field to call for further investigation of suicide risk associated with familial BP that examines biological, psychological and environmental factors (Klimes-Dougan et al., 2008).

Suicidal ideation--defined as thoughts of harming or killing oneself (O'Carroll et al., 1996)—has been shown to reliably precede suicidal behavior (Klimes-Dougan et al., 1999; Thompson et al., 2009a). Furthermore, SI represents a potent indicator of suicide attempt over one year (Kessler et al., 1999), and at its worst lifetime level is associated with completed suicide (Joiner et al., 2003). Therefore, identification of ideation-related variables in this high-risk population may inform prevention and early intervention efforts. Yet, little is known about risk factors associated with SI among offspring of parents with BP.

The majority of studies examining risk factors associated with SI in youth were conducted with either mixed psychiatric samples or epidemiological samples. These studies converge on a variety of biological, psychological and environmental risk factors for SI, including familial psychopathology (in particular mood disorder), family history of SI and behavior, and individual psychopathology (Goodwin et al., 2004; Lieb et al., 2005; Cerel & Roberts, 2005). Mood, anxiety (Kosky, Silburn & Zubrick, 1990), and substance use disorders (Kirkpatrick-Smith et al., 1991) have been demonstrated to confer increased risk for SI in youth; each of these occurs at increased rates among the children of parents with bipolar disorder (Chang et al., 2000; Duffy et al., 2009). Multiple family variables have also been associated with SI in youth, including family stress (e.g., death and loss) and high levels of family conflict (Garfinkel et al., 1982; Tousignant et al., 1993; King et al., 2001; de Man et al., 1993; de Man & Labreche-Gauthier, 1991; Kelly et al., 2001). Another clear risk factor for SI in youth is early abuse and trauma (Bridge et al., 2006; Brent & Mann, 2006; Mann, 2003).

The aim of the current study was to examine rates of SI among the offspring of parents with BP as compared with the offspring of community control parents, and to subsequently examine clinical and familial risk factors associated with SI in the high-risk group of BP offspring. Given the dearth of information on predictors of SI specific to this population, we approached these analyses as exploratory. By identifying ideation-related factors, we aimed to aid in the identification of individuals at highest risk for suicidal behavior for whom prevention and early intervention may be targeted.

Method

Participants

The methods employed in the Pittsburgh Bipolar Offspring Study (BIOS) have been described in detail in prior publications (Birmaher et al., 2009). In brief, the BIOS sample includes 388 offspring of 233 parents who fulfill Diagnostic and Statistical Manual, Version-IV (DSM-IV)(American Psychiatric Association, 1994) criteria for BPI or BPPII, as well as a control sample of 250 offspring of 142 demographically matched community

parents. Parents with BP were recruited through advertisements (53%), adult BP research studies (31%), and outpatient clinics (16%); control parents were ascertained by random-digit dialing and were group matched for age, sex and neighborhood to the parents with BP. All probands gave informed consent for their participation, and child participants provided informed assent.

Exclusion criteria for parents included current or lifetime diagnoses of schizophrenia or mental retardation; mood disorders secondary to substance abuse, medical conditions, or medications; and living more than 200 miles from Pittsburgh. Exclusion criteria for the control group were the same as those for the BP group, with the additional criterion that neither biological parent had BP, nor a first-degree relative with BP. All offspring of each eligible parent between the ages of 6–18 years were included unless they were deemed incapable of completing the assessments (e.g., mental retardation).

Measures

Proband and Co-Parent Diagnosis and Clinical Variables—DSM-IV Axis I disorders for probands and participating biological co-parents (30%) were ascertained using the Structured Clinical Interview-DSM-IV Axis I Disorders (SCID-I; Spitzer et al., 1992). Attention Deficit Hyperactivity Disorder (ADHD), Disruptive Behavior Disorders (DBD), and Separation Anxiety Disorder were also assessed using these modules from the Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present and Lifetime Version (K-SADS-PL; Kaufman et al., 1997). To assess Axis I conditions among biological co-parents who did not participate in study interviews (70%), we utilized the Family History-Research Diagnostic Criteria method (FH-RDC; Andreasen et al., 1977) and the ADHD and DBD items from the KSADS-PL. Lifetime Axis II pathology in probands and participating co-parents was assessed at intake using the Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II; First et al., 1997). The evaluator rated the proband parent's current and most severe past level of general functioning using the Global Assessment of Functioning Scale (GAF; Endicott et al., 1976).

History of suicidal behavior in probands was assessed using an abbreviated version of the Columbia Suicide History Form (Oquendo et al., 2003). Those individuals with any lifetime suicidal behavior coded as actual, interrupted, aborted or ambiguous suicide attempt was considered to have a positive lifetime history of attempt for the current analyses. Current SI in probands was assessed at intake using the Beck Depression Inventory (BDI) "suicidal thoughts or wishes" item # 9 (Beck et al., 1988). Parental history of childhood physical and sexual abuse was assessed using the SCID-I. A Parental Health Screen Form yielded information on parental history of psychiatric hospitalization. Probands completed the Aggression Questionnaire (AQ; Buss & Perry, 1992) about themselves at intake.

Offspring Diagnosis—Parents were interviewed about their children and children were directly interviewed to assess for present and lifetime non-mood DSM-IV Axis I disorders using the K-SADS-PL (Kaufman et al., 1997). To quantify the severity of manic and depressive symptoms in a more detailed assessment, the mania and depression sections of the K-SADS-PL were replaced by the K-SADS Mania Rating Scale (K-MRS; Axelson et al., 2003) and the depression section of the K-SADS-P for 73% of participating youth (n=468; n=170 received the standard K-SADS-PL). K-SADS symptom ratings and diagnoses were based on consensus ratings incorporating all available data; in the event of conflicting information, summary ratings were guided by clinical judgment. Diagnoses were confirmed by a child psychiatrist subsequent to the interview.

Clinical Factors—Demographic information including age, race, sex, and living situation (i.e., the parent(s)/guardian(s) with whom the child was residing) was obtained through use of the General Information Sheet widely used at the University of Pittsburgh. Socio-economic status (SES) was ascertained using the Hollingshead four-factor scale (Hollingshead, 1975).

Non-suicidal self-injurious behavior in offspring was assessed via item #30 (“non-suicidal physical self-damaging acts”) on the K-SADS-P depression scale (rated 0–6). Ratings of “3” (infrequent, 1–3 times) or greater were regarded as present for the current analyses. This criterion corresponds with a rating of “2” (infrequent, 1–3 times) or greater for those subjects who received the standard K-SADS-PL (rated 0–3). Consistent with proband ratings, lifetime suicide attempt in offspring was determined via an abbreviated version of the Columbia Suicide History Form (Oquendo et al., 2003).

The Stressful Life Events Schedule (SLES; Williamson et al., 2003) was administered to assess environmental stressors among offspring over the past year. Parents completed the Western Psychiatric Institute Medical History form about their child at intake to provide information on current and lifetime major medical illnesses, hospitalizations, and physical and sexual abuse. The assessment of psychological risk factors in offspring included the self-report Childhood Affective Dysregulation Scale (CADS; Kolko et al., 2001), which yields scores on the following subscales: aggression, impulsivity, mood lability, anger and irritability. Finally, youth completed the Children’s Hostility Inventory (CHI; Kazdin et al., 1987).

Family Factors—To assess family environment, youth and their parents completed the Conflict Behavior Questionnaire (CBQ; Robin & Foster, 1995), a measure of family conflict and communication. Youth also completed the Family Adaptability and Cohesion Evaluation Scale (FACES-II; Olsen et al., 1985), a measure of family functioning.

Suicidal ideation—Lifetime SI among offspring was assessed at intake. The offspring was considered to have SI if any one or more of the following SI items was rated as positive: current and/or past SI item (#25) on the depression section of the K-SADS-P summary score rated “2” (slight, i.e., thoughts of his/her own death) or greater; current and/or past K-SADS-PL SI item summary score rated “2” (subthreshold, i.e., occasional thoughts of suicide but has not thought of a specific method) or greater; SI item #16 (“I thought that life wasn’t worth living”) and/or #19 (“I thought about killing myself”) on the child-and/or parent-report Mood and Feelings Questionnaire (MFQ; Kent et al., 1997; Sharp et al., 2006) rated “sometimes” or “true.” Per the K-SADS-P rating guidelines, the SI item was initially rated only in the context of the worst lifetime depressive episode and/or the current depressive episode for the first 129 subjects. BIOS investigators then modified the K-SADS-P suicidality item ratings to capture any lifetime SI. The MFQ yields ratings of SI during the two weeks preceding study intake. Internal consistency of the six SI items was high, Cronbach’s $\alpha = 0.66$.

Interviews

Bachelors- or masters-level clinical interviewers completed intensive training on all study instruments, and achieved 80% agreement with a certified rater. Approximately 90% of assessments were conducted in the participants’ homes. All data were presented to a child psychiatrist for diagnostic consensus. Whenever clinically indicated based on the information disclosed during the course of the research evaluation, families were provided with appropriate treatment referrals by study staff.

Statistical analysis

Parametric and nonparametric methods were used as appropriate in SPSS 17.0 to compare rates of SI between offspring of BP probands and offspring of controls, and to examine the baseline demographic, clinical and familial differences among those offspring of BP parents with and without a history of SI. Given that 113 probands with BP have more than one offspring in the sample, in analyses examining the association between proband parents' characteristics and offspring SI, those parents with at least one offspring with SI were considered among the "offspring with SI" group ($n=70$ BP probands with > 1 child in the study of whom at least one has SI).

Variables significantly associated with SI among offspring in the univariate analyses ($p < 0.20$) were then considered in model selection exploratory analyses. Using proc GLMSELECT (SAS 9.2), we selected variables that optimized the predicted residual sum of squares (PRESS). We then explored these predictors using stepwise regression and least angle regression (LAR), which considers the correlation among the predictors. The effects of selected variables from both models were then estimated using a mixed effects model adjusting for inter-family correlation and significant demographics.

Results

Rates of suicidal ideation

Of 388 offspring of BP parents, 130 (33.5%) endorsed lifetime SI. The rate of lifetime SI among offspring of parents with BP was significantly greater than that of offspring of control parents (49/250; 19.6%; OR = 2.1, 95% CI = 1.4–3.0, $p < 0.0002$). This difference remained statistically significant after controlling for family correlations and significant demographic differences between the groups (race, living situation, SES; OR = 1.9, 95% CI = 1.3–2.8, $p = 0.002$).

Characteristics of offspring of parents with bipolar disorder and offspring suicidal ideation

Demographic and clinical characteristics of offspring of parents with BP by lifetime history of SI are presented in Table 1. There were no significant differences between offspring of BP parents with and without SI with respect to age, gender, race or living situation.

With respect to psychopathology, those offspring with SI had significantly higher rates of nearly every Axis I disorder/category of disorders considered, including bipolar, depression, anxiety, ADHD, and DBD; only substance use disorders occurred at similar rates among those offspring with and without SI. Offspring with SI were more likely to have psychiatric comorbidity (i.e., greater than one Axis I diagnosis) and, on average, met criteria for a greater number of Axis I diagnoses. Furthermore, suicidal offspring endorsed greater rates of lifetime non-suicidal self-injurious behavior. Significantly elevated ratings of aggression, impulsivity, lability, anger, irritability, and hostility on the CADS and CHI distinguished suicidal offspring of BP parents from non-suicidal offspring of BP parents.

Suicidal offspring of BP parents were also more likely to endorse both a lifetime and recent history of trauma. Higher lifetime rates of sexual and/or physical abuse were evident among offspring with SI as compared to those without. Furthermore, offspring with SI were more likely to report sexual abuse and death of an important person in their lives in the prior year. However, offspring with and without SI endorsed similar rates of being bullied over the prior year.

Self- and parent-rated family conflict on the CBQ was significantly greater among offspring with SI as compared those without SI. With respect to scores on the FACES-II, youth with SI rated their families as significantly less cohesive and also less adaptable.

Among the entire sample of offspring of BP parents, 14 (3.6%) endorsed a history of suicide attempt at intake. All of these offspring were from the group who endorsed lifetime SI. Those offspring of BP parents who endorsed SI and a history of suicide attempt, as compared with those who endorsed SI with no history of attempt, were significantly older (mean age attempters 14.4 ± 3.5 vs. non-attempters 12.1 ± 3.4 , $p = 0.02$) and had greater rates of depression (50% vs. 19.8%, $p = 0.02$), anxiety disorder (64.3% vs. 31.9%, $p = 0.03$), and substance use disorder (21.4% vs. 4.3%, $p = 0.04$). On average, attempters also met criteria for more Axis I diagnoses (2.2 ± 1.2 vs. 1.4 ± 1.3 , $p = 0.03$). There have been no completed suicides in the sample to date.

Characteristics of parents with bipolar disorder and suicidal ideation in offspring

As shown in Table 2, BP proband parents of at least one offspring with SI had lower SES than BP proband parents of offspring with no SI. However, there were no significant differences between the proband parents of the two groups with respect to age, gender, race or marital status. Moreover, BP proband parents with suicidal offspring did not differ from BP proband parents of offspring without suicidality in BP subtype, age of BP onset, or age of first depressive episode onset. Rates of Axis II comorbidity and comorbid anxiety disorder and substance use disorder were similar between groups. However, BP proband parents with at least one suicidal offspring exhibited higher rates of lifetime ADHD and DBD. Neither rates of SI nor attempt distinguished those probands with from those without suicidal offspring, nor did proband parent history of physical or sexual abuse. Those BP probands with suicidal offspring rated themselves higher on aggression and exhibited lower ratings of current global functioning; ratings of most severe past functioning did not distinguish probands with from those without suicidal offspring.

The co-parents of offspring with SI, as compared with those without, did not significantly differ on rates of any of the lifetime Axis I disorders examined, including: depression (17.3% vs. 19.1%, $p = 0.7$), BP (3.8% vs. 3.8%, $p > 0.9$), anxiety disorder (10.5% vs. 13%, $p = 0.6$), psychotic disorder (1.9% vs. 0.0%, $p = 0.2$), alcohol/substance use disorder (33.7% vs. 34.8%, $p = 0.9$), DBD (5.7% vs. 7.6%, $p = 0.6$), or ADHD (2.9% vs. 3.0%, $p > 0.9$).

Best-Fit Model

In order to examine a model best fit to predict offspring lifetime SI, those variables significantly associated with SI among offspring in the univariate analyses ($p < 0.20$) were considered in model selection exploratory analyses and then entered into a mixed effects model. After covarying for the effects of within family correlations and SES, five factors remained significantly predictive of offspring SI (Table 3): offspring hostility, offspring depressive disorder, offspring bipolar disorder, offspring sexual abuse (past year), and family conflict (parent-rated). Family cohesion and proband's current level of global functioning remained associated with offspring SI at the trend level in the final model.

Discussion

Offspring of parents with BP in our sample exhibited higher rates of lifetime SI as compared with offspring of matched controls (33% versus 20%). Our results support a significant association between specific clinical risk factors and lifetime SI among offspring of parents with BP. In a multivariate model adjusting for within family correlation, those factors most strongly associated with lifetime SI in offspring included offspring history of depression,

offspring history of bipolar disorder, offspring hostility, offspring sexual abuse within the prior year, and family conflict. Proband parent clinical factors, including comorbidity and history of suicidality did not remain significantly associated with SI in offspring in the multivariate model.

As expected, rates of lifetime SI in offspring of parents with BP were elevated as compared with rates among offspring of controls. The rates of lifetime SI among offspring of community control probands in our sample are highly consistent with the 17.7% median lifetime rate of SI documented among middle school students in the United States (Whalen et al., 2005). Therefore, our analyses appear to indicate elevated suicide risk among offspring of parents with BP. Given that the average age of this sample was 12 years, the majority of youth have yet to pass through the greatest risk period for suicidality. These findings argue for thorough suicide risk assessment and early suicide prevention efforts among the offspring of parents with BP.

Primarily, we found that mood disorders in the offspring of parents with BP were significantly associated with offspring lifetime SI. This finding is not surprising given that both BP and unipolar depression consistently emerge in the literature as potent risk factors for adolescent suicidal behavior (Brent et al., 2004). Indeed, SI in offspring was largely explained by offspring mood disorder—a similar finding to that described among the offspring of mood-disordered suicide attempters who attempted suicide themselves (Brent et al., 2004).

Every non-mood Axis I diagnosis considered among offspring, with the exception of substance use disorder, was significantly associated with offspring SI in the univariate analyses; however, none remained significant when accounting for other factors. Although mood disorders consistently emerge as the most potent class of psychiatric disorders associated with suicidality (Brent et al., 1993; Spirito, 2003), our findings are in keeping with literature documenting increased risk for youth suicidality associated with non-mood disorder comorbidity (Fergusson & Lynskey, 1995; Kerfoot et al., 1996). The finding that substance use disorder did not distinguish suicidal from non-suicidal offspring was unexpected given findings supporting an association between these constructs in prior studies (Kandel et al., 1991). However, few youth had developed substance use disorder at intake, likely explained by the young mean age of the sample. We anticipate that prospective data will provide greater opportunity to explore the relative contribution of substance use disorder to suicidality in this population.

We found that BP proband parent history of SI or attempt was not significantly associated with SI in offspring. The majority of studies in the literature that document a significant relationship between parental suicidality (ideation and/or behavior) and increased risk for offspring SI are epidemiological samples that include probands with a variety of psychiatric disturbances (Lieb et al., 2005; Cerel & Roberts, 2005; Goodwin et al., 2004; Thompson et al., 2009b). Whereas in a clinical sample of mothers with mood disorders (depression or bipolar disorder) and their offspring, Klimes-Dougan and colleagues (1999) found that a history of maternal suicide attempt was significantly associated with lifetime SI in offspring. Perhaps offspring of parents with BP exhibit a unique profile of risk for SI. Possibly the extent and severity of offspring psychopathology in our sample rendered the contribution of parental factors to offspring SI relatively diminished. Alternatively, SI may not be familial, or significantly less heritable than suicidal behavior; indeed, other studies have failed to find evidence supporting familiarity of SI over and above risk for psychopathology (Farmer et al., 2001; Dikeos et al., 2004; Brent & Melhem, 2008). Nonetheless, clear evidence supports familiarity of suicide attempts (Brent et al., 1994; Brent et al., 2002; Roy, 1983; Brent et al.,

2004). We anticipate sufficient rates of suicide attempts to examine this question when the sample ages into adolescence.

None of the proband parent characteristics remained significantly associated with offspring SI in the final model; proband's current global functioning remained at the trend level. Indeed, psychosocial impairment among depressed mothers has been demonstrated to predict poorer outcomes among offspring (Susman et al., 1985). Furthermore, even among offspring who receive treatment, outcomes are less favorable for those whose mothers exhibit persistent impairment (Brent et al., 1998). Psychosocial treatment for depressed mothers of youth undergoing psychiatric treatment has been demonstrated to positively impact maternal psychosocial functioning, which in turn may mediate offspring outcomes (Swartz et al., 2008). Thus, it appears important when treating offspring of parents with BP to attend to parental well-being, and refer those parents who are exhibiting impairment for appropriate treatment.

Although lifetime and recent history of abuse, trauma and loss were associated with offspring SI in the univariate analyses, only sexual abuse in the prior year remained significantly associated with SI in the multivariate model. Indeed, recent abuse has been linked to suicidality in youth even after controlling for the effects of mood disorder (Garfinkel et al., 1982; King et al., 2001; DeBellis et al., 1994). The intergenerational transmission of sexual abuse has been proposed as an additional avenue for the transmission of suicidal behavior from mood-disordered parents to their offspring, however, we did not detect this association (Brent et al., 2002). It is possible that in our sample, the biological risk for SI attributable to mood disorder was stronger than that found among a more diagnostically heterogeneous sample of mood-disordered parents, in which environmental factors like trauma could play a more prominent role in suicide risk. Additionally, it may be that a different familial risk profile exists for SI, as compared with suicidal behavior.

We found that self-rated hostility in offspring was associated with SI. Hostility is closely linked to impulsive aggression—that is, the tendency to react to frustration or provocation with aggression (Brent, 2001). Given that impulsive aggression is heritable (Coccaro et al., 1997), reliably predicts suicidal behavior (Melhem et al., 2007), and mediates the transmission of suicidal behavior (Brent et al., 2003), it may be that hostility represents a familial pathway for SI in offspring of parents with BP. Future studies should further examine the familiarity of hostility, its association with impulsive aggression, and its role in the familial transmission of suicidality.

In keeping with the literature on family environment among suicidal youth (Garfinkel et al., 1982; Tousignant et al., 1993), we found that proband parents with suicidal offspring endorsed higher levels of family conflict. As such, parent-child conflict in families with mood-disordered parents should alert clinicians to assess for suicidality in offspring. Additionally, low family cohesion—that is, the level of warmth and emotional closeness between family members—distinguished offspring with SI in the final model at the trend level. Other studies also find lower levels of cohesion among families of suicidal youth as compared with families of non-suicidal psychiatric subjects and healthy controls (Campbell et al., 1993). It is important to note that the specific nature of the association between family environment and suicidality in youth remains unclear. Specific elements of the family environment (e.g., conflict, cohesion) may represent risk factors for suicidality in vulnerable youth, or alternatively, suicidality in youth may contribute to strain evident in the family environment. Longitudinal data from the BIOS sample will enable use to address this temporal question. Given findings indicating that families with at least one parent with bipolar disorder demonstrate higher conflict and lower cohesion as compared with families with healthy parents (Romero et al., 2005), family conflict and cohesion should be

considered among the treatment targets for families with mood disordered parents and their offspring.

The converging evidence thus supports a relationship between offspring clinical factors and SI among offspring of parents with BP. However, it remains unclear whether a unique risk profile characterizes suicidal offspring of parents with BP, or whether suicidal risk in these youth is similar to that of other groups of at-risk youth. Additionally, the temporal nature of these associations remains unknown. That is, which of these variables represent risk factors predictive of SI in offspring of parents with BP, and which come about as a result of SI in offspring? Future analyses from the BIOS sample employing longitudinal data will allow us to address the temporal relationship between these variables.

Limitations

Limitations of the present study include reliance on patient and parent retrospective report of SI as well as clinical and familial factors. Additionally, determination of lifetime SI in offspring was based on a single item from the K-SADS (reflecting SI only during the worst lifetime depressive episode and/or the current depressive episode in 34% of the sample and subsequently modified to capture any lifetime SI) and the MFQ (SI during the two weeks preceding intake). Rates of lifetime SI yielded from these ratings may therefore be an underestimate of lifetime SI, since SI may have occurred outside of these timeframes rated. Finally, although non-bipolar psychopathology was present among the control proband parents, we did not expressly examine risk factors for SI among sub-groups of control offspring (e.g., offspring of depressed community control probands) due to limited power. Therefore, the extent to which the risk factors for SI among offspring of bipolar probands are unique to this group was not examined.

Conclusions

Offspring of parents with BP displayed elevated rates of SI as compared with offspring of community controls. Our findings suggest a relationship between specific clinical risk factors and SI among offspring of parents with BP. Suicide risk assessment for the offspring of parents with BP should give careful attention to youths' Axis I diagnoses, in particular mood disorders, as well as recent sexual abuse. Treatment goals for such families should include suicide risk management in addition to treatment for Axis I conditions. Family interventions may focus on decreasing family conflict, whereas individual interventions may target excessive hostility. Treatment providers for offspring of parents with BP should also attend to parental functioning, and refer parents for appropriate treatment.

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Table 1

Offspring characteristics and history of suicidal ideation

Offspring characteristics	History of Suicidal ideation		
	No N=258	Yes N=130	p-value
Demographics			
Male	133 (51.6%)	67 (51.5%)	>0.99
White	205 (79.5%)	111 (85.4%)	0.16
Age	11.8 ± 3.7	12.3 ± 3.5	0.20
Living with both natural parents	110 (43%)	52 (40%)	0.60
Axis I Diagnoses			
Bipolar disorder	18 (7%)	22 (16.9%)	0.002
Unipolar depression	11 (4.3%)	30 (23.1%)	<0.001
Anxiety disorder	53 (20.9%)	46 (35.4%)	0.002
Attention deficit hyperactivity disorder	45 (17.4%)	50 (38.5%)	<0.001
Disruptive behavior disorder	31 (12%)	43 (33.1%)	<0.001
Substance use disorder	8 (3.1%)	8 (6.2%)	0.15
Comorbidity (> 1 Axis I Disorder)	105(40.7%)	96 (73.9%)	<.001
Number of Axis I Disorders	0.7±1.0	1.5±1.3	<.001
Clinical Characteristics			
Non-suicidal self-injurious behavior	11 (4.3%)	17(13.2%)	0.002
CADS ^a Total Score	45.4 ± 13.6	55.7 ± 16.2	<0.001
Aggression (CADS subscale)	13.8 ± 4.3	16.7 ± 5.4	<0.001
Impulsivity (CADS subscale)	12.9 ± 4.4	15.8 ± 4.9	<0.001
Mood lability (CADS subscale)	5.7 ± 2.2	7.3 ± 2.6	<0.001
Anger (CADS subscale)	6.6 ± 2.5	8.1 ± 3.0	<0.001
Irritability (CADS subscale)	6.3 ± 2.3	7.9 ± 2.6	<0.001
Hostility (CHI ^b total score)	17.6 ± 6.7	23.9 ± 6.2	<0.001
History of Trauma			
Lifetime physical/sexual abuse	11 (4.3%)	19 (14.7%)	<0.001
Sexual abuse (past year)	7 (2.9%)	18 (14.1%)	<0.001
Being bullied (past year)	40 (16.3%)	27 (21.1%)	0.26
Death of close friend/relative (past year)	71 (29%)	51 (39.7%)	0.03
Family Factors			
Conflict with father (CBQ ^c child-report)	3.7 ± 4.6	7.3 ± 6.3	<0.001
Conflict with mother (CBQ child-report)	3.2 ± 3.8	6.1 ± 5.0	<0.001
Parent-child conflict (CBQ parent-report)	5.3 ± 5.5	9.0 ± 5.9	<0.001
Family Cohesion (FACES ^d child-report)	58.5 ± 11.5	52.2 ± 11.7	<0.001
Family Adaptability (FACES child-report)	43.4 ± 8.3	41.0 ± 9.0	0.01

^aChildhood Affective Dysregulation Scale^bChildren's Hostility Inventory

^cConflict Behavior Questionnaire

^dFamily Adaptability and Cohesion Scale

Table 2

Bipolar proband parent characteristics and history of suicidal ideation in offspring

Bipolar Proband Parent Characteristic	<u>History of suicidal ideation in offspring</u>		
	No (N=123)	Yes (N= 110)	p-value
Demographics			
Female	99 (80.5%)	88 (80%)	0.9
Caucasian	107(87%)	99 (90%)	0.5
Married	62 (50.4%)	52 (47.3%)	0.7
Age	39.7 ± 8.0	39.5 ± 7.2	0.9
Socio-economic status (SES) ^a	36.6 ± 14.2	32.6 ± 14.3	0.03
Clinical Characteristics			
Bipolar subtype (BPI)	82 (66.7%)	77 (70%)	0.6
Age of bipolar disorder onset	35.8 ± 9.3	36.4 ± 8.7	0.7
Age of first major depressive episode	19.0 ± 8.0	19.4 ± 8.6	0.7
Comorbid Conditions			
Anxiety disorder	86 (69.9%)	82 (74.5%)	0.4
Attention deficit hyperactivity disorder	23 (18.7%)	37 (33.6%)	0.009
Substance use disorder	72 (58.5%)	77 (70%)	0.07
Disruptive behavior disorder	34 (27.6%)	47 (42.7%)	0.016
Axis II (borderline or antisocial)	21 (33.9%)	23 (31.9%)	0.8
Lifetime Suicidality			
Suicidal ideation	47 (38.5%)	51 (48.6%)	0.1
Suicide attempt	37 (30.6%)	41 (37.3%)	0.3
Lifetime History of Abuse			
Physical abuse	28 (24.1%)	31 (29.8%)	0.3
Sexual abuse	41 (34.5%)	42 (40.8%)	0.3
Clinical Characteristics			
Aggression (AQ ^b Total score)	83.4 ± 26.4	92.4 ± 27.9	0.02
Current global functioning (GAF ^c)	64.0 ± 13.3	59.5 ± 11.0	0.005
Most severe past global functioning (GAF)	32.9 ± 13.8	33.5 ± 13.4	0.7

^aHollingshead four-factor criteria (1975)^bAggression Questionnaire^cGlobal Assessment of Functioning

Table 3

Best-fit model of predictors of history of suicidal ideation in offspring of parents with bipolar disorder

Offspring Characteristic	OR (95%CI)	<i>p</i> -value
Hostility	2.6 (1.8–3.9)	<0.0001
Depression	5.5 (2.0–14.9)	0.001
Sexual abuse (past year)	4.7 (1.1–20.3)	0.04
Bipolar Disorder	3.0 (1.1–8.0)	0.03
Family conflict	1.6 (1.1–2.4)	0.01
Current global functioning-Proband (GAF current)	1.5 (1.0–2.1)	0.07
Family cohesion	1.4 (1.0–2.0)	0.07

Significant demographic difference between groups (i.e., SES) entered as covariate Model controlling for familial correlation