

**Chronic Stress and Stressful Life Events in the Offspring of Parents**

**With Bipolar Disorder**

**Caroline Ostiguy**

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**in**

**The Department**

**of**

**Psychology**

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## ABSTRACT

### Chronic Stress and Stressful Life Events in the Offspring of Parents With Bipolar Disorder

Caroline Ostiguy

The stress generation theory suggests that depressed individuals and children of depressed mothers are prone to create stressors that are interpersonal and dependent on their behaviour. Exposure to this “self-generated” stress is believed to increase the risk for onset and recurrence of depression. Much less is known about stress in the offspring of parents with bipolar disorder (OBD). As part of an ongoing longitudinal study, 37 OBD and 33 offspring of parents with no mental disorder (13 to 26 years old) were interviewed using the UCLA Life Stress Interview. Participants were asked about their current life circumstances (chronic stress) and negative events that occurred in the last year (episodic stress). The OBD reported more difficulties in both the interpersonal and non-interpersonal domains of chronic functioning than the offspring of parents with no mental disorder. The group differences in chronic functioning remained significant after controlling for the presence of affective disorders, indicating that the effect of risk status on chronic stress is independent of the problems associated with having a disorder. With respect to episodic stress, the OBD were almost 4 times more likely to have experienced an interpersonal stressful event of moderate to severe impact compared to the controls. There was no group difference between dependent and independent life events. Although the findings do not support the stress generation theory in the OBD, they suggest that elevated levels of episodic and chronic stress may be important premorbid markers of risk in high risk participants in adolescence and early adulthood.

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I dedicate this thesis to the memory of Monique Chicoine.

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Bipolar disorder (BD) is a severe and chronic mental disorder that is becoming increasingly costly to society. In 2001, BD was ranked as the ninth leading cause of years lived with disability (World Health Organization, 2001). BD is also associated with a heavy use of health services and welfare, as well as a heightened risk for suicide (Judd & Akiskal, 2003). The impairment in functioning due to the disorder is pervasive and enduring (Coryell et al., 1993). The lifetime prevalence rate of BD is 1% to 1.6% (Kessler et al., 1994; Weissman et al., 1996), and the age of onset is typically late adolescence and early adulthood (Burke, Burke, Regier, & Rae, 1990; Weissman et al., 1988). In light of the huge economic impact of BD, an examination of the offspring of parents with BD – a group at high risk for developing a mood disorder, is warranted. In identifying risk factors for the disorder in an at risk group, it may be possible to develop preventative interventions which may ultimately lead to increased functioning and better quality of life in these individuals.

Offspring of parents with bipolar disorder (OBD) are at increased risk for developing a range of mental disorders (for review, see DelBello & Geller, 2001), such as mood disorders, anxiety disorders, substance abuse, attention-deficit/hyperactivity disorder, and oppositional defiant disorder (Henin et al., 2005; Hillegers et al., 2005; Reichart et al., 2004; Singh et al., 2007; Waters, Marchenko, & Smiley, 1983). A comprehensive review of the literature demonstrated that the OBD are two and a half times more likely to be diagnosed with any mental disorder and four times more likely to be diagnosed with an affective disorder than offspring of parents with no mental disorder (Lapalme, Hodgins, & LaRoche, 1997). Moreover, the OBD are at increased risk for other problems, such as deviant school behaviours, suicidality, as well as impaired



academic performance and psychosocial functioning (Henin et al., 2005; Hodgins, Paucher, Zaras, & Ellenbogen, 2002). At age two, male OBD already show more inappropriate aggressive behaviours, are more reactive to stressful situations, and have more difficulty engaging in friendly play and sharing than offspring of parents with no mental disorder (Zahn-Waxler, Cummings, McKnew, & Radke-Yarrow, 1984). A recent study found impairment in the OBD's social functioning, but only for offspring who were over 18 years old and had been diagnosed with a mental disorder (Reichart et al., 2007). The absence of impairments in the OBD without a diagnosis might be due to the use of the Child Behavior Checklist (CBCL), a self-report measure of social functioning, which has failed to detect group differences in other studies (e.g., Anderson & Hammen, 1993; Ellenbogen, Hodgins, & Walker, 2004).

Although hereditary influences are important in the etiology of bipolar disorder and associated problems (Allen, 1976; McGuffin et al., 2003; Todd et al., 1996), environmental factors also contribute to the development of difficulties in these offspring, both directly and by activating susceptibility genes during development (DelBello & Geller, 2001; Walker, Sabuwalla, & Huot, 2004). A review of studies examining the OBD showed that stressful environmental factors such as marital discord, poor quality of parenting, and the presence of a second parent with psychopathology were all associated with the development of disorders in the offspring (DelBello & Geller, 2001). Others have found that parents with BD create a familial environment that is unstable, chaotic, and lacking in structure (Chang, Blasey, Ketter, & Steiner, 2001; Ellenbogen & Hodgins, 2004; Ellenbogen, Hodgins, Walker, Couture, & Adam, 2006; Hodgins et al., 2002; Romero, DelBello, Soutullo, Stanford, & Strakowski, 2005). In addition, parents with BD

have been found to have high scores on neuroticism, which is associated with fewer social contacts, poor marital functioning, more verbal aggression, and the use of less problem-focused and more emotion-focused coping skills (Ellenbogen & Hodgins, 2004). Moreover, mothers with BD tend to have more negative interactions with their children than mothers without BD (Inoff-Germain, Nottelmann, & Radke-Yarrow, 1992; Meyer et al., 2006). These findings suggest that OBD, in addition to being genetically at risk for the development of psychiatric disorders, are exposed to an environment that is likely to create stressors, and thus, increase the risk of psychopathology and associated impairments.

An important environmental variable to consider in developmental psychopathology is stress. Multiple cross-sectional studies have shown that exposure to stressful life events is associated with depression, anxiety, delinquent behaviours, suicide attempts, poor health, and acting out behaviours (for reviews, see Compas, 1987; Paykel, 2003). Yet, most studies cannot conclude whether stress is a predictor of the onset of symptoms or whether the symptoms and associated distress create stress (Wals et al., 2005). Brown and Harris' seminal studies of stress (Brown, 1979; Brown & Harris, 1978; Brown & Harris, 1989) examined the role of the current environment in the development of depression in women. Their results indicated that the presence of depressive symptoms was highly associated with the occurrence of major negative life events (Brown, 1979). More specifically, 78% of the women with depressive symptoms had experienced a negative life event in the two months prior to the onset of their depressive episode. At the same time, the study indicated that only half the women who had a recent major stressor in their life developed depressive symptoms. Thus, they

reasoned that certain women possess vulnerability factors that increase their susceptibility to develop depression following negative life events. Since then, much effort has been put into building models to explain the association between stress and the development of psychopathology. Most research has focused on developing either stress-diathesis models, in which individuals who possess a vulnerability factor are more likely than other individuals to develop a disorder following the occurrence of negative life events (e.g., Ingram, Miranda, & Segal, 1998), or transactional models, in which an individual and his/her environment influence each other to maintain a cycle of symptoms and stress (for review, see Sameroff & Mackenzie, 2003).

One theoretical model that suggests a bidirectional association between stress and psychopathology is the stress generation theory (Hammen, 1991b). Hammen examined SLEs in women who had either a diagnosis of unipolar depression, bipolar depression, a chronic physical illness, or no disorder (controls). She found that depressed women experienced more dependent events, that is, events which are partly due to their own behaviour, than controls. They also reported more stressful interpersonal events than all the other groups. The bipolar women did not differ from the controls. She concluded that depressed individuals are more prone to create stressors that are in part dependent on their behaviours and interpersonal in nature than individuals who are not depressed. This propensity to generate stressors leads depressed individuals into a cycle of depression and stress (Hammen, 2005). In other words, depressed individuals generate stressors that can exacerbate their symptoms; when symptoms remit, the creation of stressors can precipitate the recurrence of depressive symptomatology. This theory suggests that there might be some stable characteristics in depressed women that make them more prone to

the generation of SLEs (Hammen & Brennan, 2002), and that, moreover, depressed individuals are not just “passive recipients of life’s troubles” (Davila, Hammen, Burge, Paley, & Daley, 1995). In fact, women in remission have been found to have worse interpersonal functioning than women who have never been depressed, but similar functioning to currently depressed women (Hammen & Brennan, 2002), which suggests that SLEs are not just a consequence of current depressive symptoms. A study of depressed monozygotic and dizygotic twins showed that having a genetic susceptibility to depression increased the risk of experiencing interpersonal and financial SLEs (Kendler & Karkowski-Shuman, 1997). Findings from this study suggest that genes can increase vulnerability to depression by making some individuals more inclined to put themselves into stressful situations, through some gene-determined personal characteristic (Kendler & Karkowski-Shuman, 1997). This is consistent with Hammen and Brennan’s (2002) suggestion that depressed women have stable features that make them more likely to generate SLEs. The clinical implication of such findings is that treatment for depression should focus both on symptom reduction and the difficulties that give rise to SLEs (Hammen, 2003; Hammen, Shih, & Brennan, 2004). Such a therapeutic approach could reduce the risks of recurrence (Hammen, 2005).

Support for the stress generation theory has been found in studies on adolescents suffering from depression. Overall, depressed adolescents have been found to experience more dependent, interpersonal SLEs than nondepressed adolescents (Hammen & Brennan, 2001; Petti et al., 2004; Rudolph, Hammen, Burge, Lindberg, Herzberg, & Daley, 2000). Compared to boys, adolescent girls are at increased risk for the onset of major depression (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993). It is

hypothesized that their vulnerability is partially explained by the importance given to interpersonal relationships, support, and intimacy (Cyranowski, Frank, Young, & Shear, 2000; Nolen-Hoeksema & Girgus, 1994; Rudolph & Hammen, 1999). For example, Rudolph and Hammen (1999) found that boys and girls did not vary in their overall level of stressful events, but that girls experienced more interpersonal SLEs, while boys experienced more non-interpersonal SLEs (see also Hammen & Brennan, 2001). In addition to gender, age is also an important factor to consider in the relationship between stress and depression in youth. For example, it has been shown that the number of events (Goodyer & Altham, 1991), and more specifically the number of events dependent on their behaviour (Rudolph et al., 2000), increase with age during adolescence.

The stress generation theory has also been examined in adolescents with diagnoses other than depression. Goodyer and Altham (1991) found that the number of reported SLEs does not differ between anxious and depressed adolescents. However, depressive symptoms have been linked to dependent, interpersonal stressors, while symptoms of anxiety have been associated with independent, non-interpersonal stressors (Rudolph & Hammen, 1999). In addition, adolescents who experience both depression and externalizing symptoms have higher overall levels of stress than adolescents who experience only one or the other (Rudolph et al., 2000). When only externalizing symptoms are present, adolescents report more dependent, non-interpersonal SLEs (Rudolph et al., 2000). Taken together, adolescents with anxious, externalizing, or depressive symptoms have been shown to experience heightened stress, but only the latter group appears to be inclined to generate interpersonal stressors.

There is also evidence that the unaffected offspring of parents with major depression show patterns of stress exposure similar to depressed adolescents; both depressed and unaffected adolescents tend to generate more interpersonal episodic stressors than offspring of parents with no mental disorders (Adrian & Hammen, 1993; Hammen, 1991a). Daughters of depressed mothers are more likely to report interpersonal SLEs than sons (Hammen & Brennan, 2001), which is consistent with the literature on depressed adolescent girls (Rudolph & Hammen, 1999). These findings propose a pathway through which depressed mothers might transmit risk factors for depression to their children (Hammen & Brennan, 2002). Offspring of depressed mothers may inherit the maladaptive interpersonal skills that they have witnessed through the parent's dysfunctional relationships (Hammen & Brennan, 2002). There is support for the transmission of a propensity to create interpersonal difficulties, as the stress generation theory has been shown to be transgenerational (Hammen, Shih et al., 2004).

Although most of the research has focused on episodic stress, the importance of chronic stress should not be dismissed. Chronic stress refers to long term disturbances and ongoing conditions that do not have clear time boundaries; it is often used as an index of a person's functioning in different domains (e.g., friendships, work, etc.). For example, McGonagle and Kessler (1990) have found chronic stress to be a better predictor of depressive symptoms than episodic stress. Chronic stress was also found to be predictive of school and social functioning, above and beyond maternal diagnosis of depression (Hammen et al., 1987). Depressed adolescents as well as offspring of depressed mothers have been found to experience worse chronic difficulties than nondepressed children or children of parents with no mental disorder (Adrian &

Hammen, 1993; Hammen & Brennan, 2001; Rudolph et al., 2000). In light of these findings, a comprehensive investigation of stress should therefore include a simultaneous examination of both SLEs and chronic stress.

The association between major depression and stress has been studied extensively, but much less is known about stress and bipolar disorder. Some studies have suggested that SLEs are associated with the onset of BD (Ambelas, 1987; Bebbington et al., 1993; Mathew, Chandrasekaran, & Sivakumar, 1994), relapse (Cohen, Hammen, Henry, & Daley, 2004; Hammen & Gitlin, 1997), and time to recovery (Kim, Miklowitz, Biuckians, & Mullen, 2007). Regarding the stress generation theory, individuals with BD and who are high on neuroticism have been found to report more dependent stressors than individuals low on neuroticism (Ellenbogen & Hodgins, 2004). In contrast, a study of 155 undergraduate students found no relationship between dependent life events, reported retrospectively using a stress checklist, and bipolar spectrum disorder (Grandin et al., 2007). Since neuroticism has been associated with the generation of stress (Kendler, Gardner, & Prescott, 2003; Poulton & Andrews, 1992) and with mood disorders (Bagby, Binseil, Schuller, & Rector, 1997; Bienvenu et al., 2001; Solomon et al., 1996), the personality trait of neuroticism is a likely target as a mediator between psychopathology and stress generation.

Even fewer studies have examined episodic and chronic stress in the OBD. Adrian and Hammen (1993) compared the offspring of mothers diagnosed with unipolar depression, bipolar disorder, or a chronic illness to the offspring of mothers with no mental disorder. They found that the offspring of BD mothers reported a similar number of dependent stressors to the offspring of depressed mothers. Petti and colleagues (2004)

found that the OBD who developed an affective disorder reported more dependent SLEs before the onset of the disorder than the OBD who did not develop a disorder. Similarly, results from another study showed that the OBD who were diagnosed with any disorders reported more negative events within a 12 month period than both the unaffected OBD and control offspring; the two unaffected groups did not differ from each other (Duffy et al., 2006). In terms of chronic functioning, results are divided. Some studies have found no impairment in functioning among the OBD (Anderson & Hammen, 1993; Reichart et al., 2007), while others have found clear evidence of maladjustment, such as worse psychosocial functioning, impaired academic performance, and poorer peer networks (Henin et al., 2005; Hodgins et al., 2002). Two of these studies have subdivided their sample of OBD into those who have a diagnosis of mental disorder and those who do not (Pelligrini et al., 1986; Reichart et al., 2007). The study by Reichart and colleagues (2007) is of particular interest, as it is a prospective, longitudinal study of 140 OBD. They found that social functioning was impaired only in the OBD who were aged 18 or over or were diagnosed with a mood disorder (unipolar depression or bipolar disorder). The younger or non-affected offspring were not different than the offspring from the general population. This suggests that future studies of the OBD should control for the presence of psychopathology, as it may play a role above and beyond the risk status of being the offspring of a parent with BD.

The goal of the present study was to assess the mean level and type of stress experienced by the offspring of parents with BD and the offspring of parents with no mental disorder (NMD). The results of this study could inform us about the vulnerability factors associated with the onset of BD and the intergenerational transmission of these



factors. In addition, successfully identifying which types of stress are prominent in high risk populations is one step towards targeted preventive interventions.

One advantage of the present study is the use of a larger sample and improved methodology than previous studies using life event checklists or questionnaires (e.g., Ellenbogen et al., 2006; Petti et al., 2004). Episodic and chronic stress were assessed with the UCLA Life Stress Interview (Adrian & Hammen, 1993; Hammen, 1991b). Interviews have been shown to be more effective than checklists in stress research, as they take the context of events into account, are predictive of outcomes, and minimize mood-related biases (e.g., Adrian & Hammen, 1993; Dohrenwend, 2006; McQuaid, Monroe, Roberts, Kupfer, & Frank, 2000).

First, it was hypothesized that chronic functioning would be worse in the OBD than in the offspring of parents with no disorder. Second, it was hypothesized that OBD, compared to control participants, would experience a greater number of, and more severe, episodic stressors that are interpersonal in nature and dependent on their behaviour. Finally, it was hypothesized that girls, independent of their group, would experience more interpersonal SLEs than boys.

## Method

### *Participants*

The sample for this study was selected from a larger sample of subjects who participated in an ongoing prospective study of families with a parent diagnosed with bipolar disorder or parents with no disorder. Initial inclusion criteria were a) adults raising at least one biological child aged between 4 and 14 years, b) fluency in either

English or French, and c) being raised and educated in Canada. Criteria for exclusion were a) a chronic physical disease or handicap and b) an IQ outside of the normal range in either the parents or the children. Parents with a diagnosis of bipolar disorder, their spouses, and children were recruited from psychiatric departments of general hospitals and from consumer groups. Diagnoses were confirmed using the Structured Clinical Interview for *DSM-III-R* (SCID-I; Spitzer, Williams, Gibbon, & First, 1992). Families in which parents had no mental disorder were also recruited in the same geographic sectors as the bipolar families. Control parents had no current or lifetime axis I disorder (except past episodes of substance abuse, anxiety disorders, and eating disorders) as documented on the SCID-I (for more information regarding the original sample, see Ellenbogen & Hodgins, 2004). Parents of this sample were mostly white, middle-class, and French Canadian.

The present study included 42 male and 28 female participants, taken from 52 families. Results did not vary significantly whether siblings were excluded from the analyses or not, which suggests that the nested nature of these data did not appear to influence the results. The age of the participants ranged from 13 to 26 years ( $M = 19.09$ ;  $SD = 2.86$ ; see Table 1). Thirty-seven participants had a parent with BD, and 33 had parents with no mental disorder. The groups did not differ in age or gender composition. Thirty-one offspring were given a current or past diagnosis according to *DSM-IV* (American Psychiatric Association, 1994) criteria (see Table 1). Diagnoses included 14 mood disorders (dysthymia [three], bipolar disorder I [one], bipolar disorder II [two], past major depressive disorder [eight]), eight anxiety disorders (specific phobia [four], generalized anxiety disorder [four]), two substance use disorders, and seven other

diagnoses (tic disorder [two], enuresis [two], oppositional defiant disorder [one], substance-induced psychotic disorder [one], and attention-deficit/hyperactivity disorder [one]). There was a significant difference in the number of diagnoses between the OBD and the controls ( $\chi^2 = 7.32, p < .01$ ). However, there was no significant difference in the number of diagnoses of affective disorders between the two groups.

The data for the current study come from two different projects. Seventeen participants took part in an event-contingent recording study of social interactions conducted in 2005. This study included monitoring social interactions over 14 days, collecting saliva samples at home, and taking part in two interviews (SCID-I and UCLA Life Stress Interview). The UCLA Life Stress Interview was conducted approximately six months after having completed the other tasks. Fifty-three offspring participated in a second project; they were recruited between May 2006 and February 2007 for a large follow-up assessment as part of the longitudinal study of families having a parent with BD. The study included a clinical interview using the SCID-I or the Kiddie-SADS, the UCLA Life Stress Interview, the collection of saliva samples at home, computerized information processing tasks, and questionnaires. For the current study, we only use the clinical interview data.

### *Measures*

*UCLA Life Stress Interview: Chronic Stress.* The UCLA Life Stress Interview is a semi-structured interview that was developed to assess chronic and episodic stressors (Adrian & Hammen, 1993; Hammen, 1991b). The chronic stress interview has been shown to be reliable and to have good convergent and construct validity (Hammen et al.,

Table 1

*Demographic Information for the Offspring of Parents with Bipolar Disorder and Offspring of Parents with no Mental Disorder*

	OBD	Control Offspring
<i>N</i>	37	33
Gender (Male:Female)	24:13	18:15
Mean age (years) $\pm$ <i>SD</i>	19.46 $\pm$ 2.63	18.67 $\pm$ 3.09
Diagnosis	22	9
Mood Disorders	10	4
Major Depressive Disorder	6	2
Bipolar Disorder I	1	0
Bipolar Disorder II	2	0
Dysthymic Disorder	1	2
Anxiety Disorders	7	1
Substance Use Disorders	1	1
Others	4	3

*Note.* OBD = Offspring of a parent with bipolar disorder; *SD* = standard deviation. All major depression diagnoses were in full remission at the time of the interview.

1987). The interview consists in questioning about nine different domains (close relationships, social life, intimate relationships, family relationships, school, work, finances, health of self, and health of the family members) to assess the level of chronic functioning for the last six months. Each domain is coded on a five-point scale by the interviewer, using behaviour-specific anchor points. Higher scores reflect worse circumstances and impairment; it is assumed that worse circumstances and impairment reflect more stressful conditions. Composites of chronic functioning were created by summing certain domain ratings: total (all nine domains), interpersonal (friends, social life, romantic relationships, and family) and non-interpersonal (school, work, finances, health of the self, and health of the family members) functioning (Eberhart & Hammen, 2006; Hammen, Brennan, & Shih, 2004; Rudolph et al., 2000). Interviews were conducted by clinical psychologists and graduate students in clinical psychology. Interviewers were trained by Dr. Constance Hammen at UCLA or by a senior graduate student trained by Dr. Hammen. Interrater reliability was calculated based on two independent interviewers' ratings of 20 participants. Intraclass correlation coefficients revealed high reliability for all domains. Coefficients ranged from 0.75 (social life) to 0.95 (close friendship), with a mean intraclass correlation coefficient of 0.85. This intraclass correlation is similar to what has been obtained in other studies using the chronic functioning interview (range from 0.70 to 0.87; Eberhart & Hammen, 2006; Hammen & Brennan, 2002; Hammen, Brennan et al., 2004; Hammen, Shih et al., 2004; Shih, Eberhart, Hammen, & Brennan, 2006).

*UCLA Life Stress Interview: Episodic Stress.* Episodic stressors are events with a clear beginning and ending. When probing about ongoing situations, the interviewer

inquired about the presence in the last 12 months of episodic events (or SLEs) related to the domain being discussed. Interviewers asked, "Did you experience any changes or did anything happen that has caused you trouble or made you upset?" (Hammen, 1991a). Circumstances surrounding each episodic event are documented (e.g., timing, duration, previous experience with this type of events, consequences, functional impairment, etc.), but information regarding the subjective emotional response to the event is excluded. One of the goals of the coding procedures of the UCLA Episodic Life Stress Interview is to acquire ratings of life events that are more objective and less likely to be influenced by mood and emotionality biases compared to information gathered with self-report stress checklists (Rudolph et al., 2000). All events recorded by interviewers were then coded by a team of raters, composed of four to eight laboratory members, who were blind to the group or clinical status of the participant. Events were coded on two dimensions: severity and independence. Severity ratings range from 1 (no or minimal stress/negative impact) to 5 (severe stress/negative impact). Independence refers to the degree to which someone has contributed to an event. Independence ratings ranged from 1 (entirely independent) to 5 (entirely dependent). Final ratings for each event were determined by group consensus. Ratings of 3 or above are categorized as dependent in analyses (Daley et al., 1997; Rudolph & Hammen, 1999). Finally, each event was also categorized as interpersonal or non-interpersonal by the raters. Separate indexes were computed for independent, dependent, interpersonal, and non-interpersonal events by summing the objective severity ratings across the relevant events.

The episodic stress interview has been extensively used in different populations, such as women with depression, bipolar disorder, or a chronic illness (Hammen, 1991a,

1991b), adolescents with internalizing or externalizing symptoms (Rudolph et al., 2000), adolescents with major depression or bipolar disorder (Hammen & Brennan, 2001; Kim et al., 2007), and asymptomatic children and adolescents (Adrian & Hammen, 1993; Davila et al., 1995). In the Mater University Study of Pregnancy (a study of 816 mothers and their 15 year old daughters), interrater reliability based on independent rating teams yielded intraclass correlations of 0.92 (Espejo et al., 2006). Interrater reliability was not calculated for the ratings of the episodic stress in this study because only one team of raters was used.

*Structured Clinical Interview for DSM-IV (SCID-I; First et al., 2001).* The SCID-I is a semi-structured interview designed to reach clinical diagnoses according to the Diagnostic and Statistical Manual of Mental Disorders (4th ed.; APA, 1994). For major depression and bipolar disorder, the reliability (kappa) statistic varies between 0.61 and 0.93 (First & Gibbon, 2004). The SCID-I was used in the present sample with offspring aged 19 or above ( $n = 40$ ).

*Kiddie-Schedule for Affective Disorders and Schizophrenia- Present and Lifetime version (K-SADS-PL; Kaufman, Birmaher, & Brent, 1997).* The K-SADS-PL is a semi-structured interview designed to arrive at clinical diagnoses in children aged 7 to 18 years old ( $n = 30$ ). It has been shown to generate reliable diagnoses in children and adolescents and to be an advantageous interview for affective disorders (Kaufman et al., 1997; Kaufman & Schweder, 2004). In the current study, both the SCID-I and K-SADS-PL were administered by experienced clinicians or clinical graduate students with extensive training and experience in the administration of the semi-structured interviews.

### *Procedure*

As described previously, participants' data for the current study were obtained from two different projects. For both projects, offspring were contacted by telephone and those interested in participating in the study were scheduled for a laboratory visit, at Concordia University, Montreal. For the social interaction study, participants underwent a structured diagnostic interview (SCID-I) administered by a clinician or experienced graduate student in clinical psychology during the laboratory visit, and filled out questionnaires. At a later date, they were contacted and underwent the UCLA Life Stress interview. For the second study, the clinician or experienced graduate student conducted the diagnostic interview (SCID-I or Kiddie-SADS) and the UCLA Life Stress interview during the same laboratory visit. Depending on the study, participants received an honorarium of \$150 or \$180. In both projects, the interviewer first obtained written consent from the participant and his or her parent (guardian) if the participant was 17 years of age or younger. All procedures were approved by the Ethics Committee of Concordia University.

Three clinicians performed 64 clinical interviews and 55 UCLA Life Stress Interviews, while three clinical graduate students conducted six clinical interviews and 15 UCLA Life Stress Interviews.

### *Data Analyses*

All interview data were analyzed using SPSS 13.0. Hierarchical multiple regressions were performed on total, interpersonal, and non-interpersonal chronic stress in order to parcel out the variance associated with having an affective disorder. Gender X



group analyses of covariance (ANCOVA) were performed on the total severity of SLEs and total number of SLEs. Gender X group multivariate analyses of covariance (MANCOVA) were used to analyze individual chronic stress domains and the severity and frequency of different types of SLEs. All episodic events are categorized on both the dependent/independent and interpersonal/non-interpersonal dimensions; those dimensions represent two ways of classifying the same SLEs. Therefore, separate analyses were performed for each of the dimensions to avoid overlapping data in the MANCOVAs. Wilks' criterion was used to evaluate the significance of the multivariate effects. When main effects of group or gender were significant, ANOVAs were conducted on each of the dependent variables. Age was used as a covariate in the analyses described above. For the categorical variable (presence or not of at least one moderate to severe SLE), logistic regressions were used.

We checked for the presence of outliers in our sample, defined as scores at least three standard deviations from the mean. One participant's total severity rating fell 3.66 standard deviations from the mean. The analysis was performed with and without this participant. Since the findings did not vary as a result, the participant was kept in the analysis.

## Results

### *Correlations*

Table 2 shows the correlations among interpersonal and non-interpersonal chronic stress, as well as total severity scores for independent, dependent, interpersonal, and non-interpersonal SLEs. Notably, the correlation between independent and dependent

episodic stress is close to zero. Similarly the association between interpersonal and non-interpersonal episodic stress is very small. These correlations confirm that dependent versus independent stress and interpersonal versus non-interpersonal stress are independent dimensions (Rudolph & Hammen, 1999).

### *Chronic Stress*

We investigated the relationship between group status and chronic stress, while controlling for age and the presence of affective disorders. It is well known that having a diagnosis of major depression is associated with higher levels of chronic stress (e.g., Hammen & Brennan, 2001; Rudolph et al., 2000). Therefore, hierarchical multiple regressions were conducted to parcel out the variance associated with having a parent with BD from that of having a diagnosis of affective disorder on measures of total, interpersonal, and non-interpersonal stress. Independent variables were entered in the following steps: (1) age and presence of an affective disorder, (2) group and gender, (3) group by gender interaction. The regression equation predicting total chronic stress ( $R = 0.65$ ,  $F(5, 64) = 9.46$ ,  $p < .001$ ) was significant, accounting for 38% (adjusted  $R^2$ ) of the variance. The affective disorder diagnosis accounted for 4.8% of the variance in the prediction of chronic stress ( $\beta = 0.23$ ;  $t = 2.32$ ,  $p < .05$ ). More importantly, group ( $\beta = -0.40$ ;  $t = -4.06$ ,  $p < .001$ ) was still predictive of 14.7% of the variance in chronic stress, even when controlling for the presence of an affective disorder. Age ( $\beta = 0.20$ ;  $t = 2.02$ ,  $p < .05$ ) and gender ( $\beta = -0.27$ ;  $t = -2.85$ ,  $p < .01$ ) were also significant predictors. These results indicate that having a parent with bipolar disorder is predictive of higher levels of chronic stress above and beyond the well-known effects of psychopathology.

Table 2

*Correlations Among Stress Variables*

	1	2	3	4	5	6
1. Interpersonal Chronic Stress						
2. Non-interpersonal Chronic Stress	0.44**					
3. Total Independent SLEs	0.18	0.30*				
4. Total Dependent SLEs	0.08	0.30*	0.01			
5. Total Interpersonal SLEs	0.19	0.34**	0.54**	0.59**		
6. Total Non-Interpersonal SLEs	0.06	0.31**	0.51**	0.53**	0.17	

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

Results also indicate that male participants tend to have higher levels of chronic stress than female participants, and that chronic stress increases as participants get older. The results of the regressions for chronic interpersonal and non-interpersonal stress were similar to that described for total stress. The regressions on interpersonal ( $R = 0.54$ ,  $F(5, 64) = 5.38$ ,  $p < .001$ ) and non-interpersonal ( $R = 0.60$ ,  $F(5, 64) = 7.36$ ,  $p < .001$ ) stress were both significant. Group status was a significant predictor in both regressions, accounting for 7.5% and 14.2% of the variance for interpersonal and non-interpersonal stress respectively, even after controlling for affective diagnoses.

MANCOVAs were conducted to examine the individual domains of functioning (see Table 3), with age as a covariate. A significant main effect of group indicated that the OBD experienced significantly more difficulties than the control participants. There were no significant gender or group by gender effects. Follow-up ANOVAs yielded group differences in four areas of functioning. Among interpersonal domains, the OBD experienced significantly greater stress only in the family relationships ( $F(1, 63) = 12.08$ ,  $p < .001$ ) than controls. Among the non-interpersonal domains, the OBD reported more difficulties in the spheres of finances ( $F(1, 63) = 8.60$ ,  $p < .01$ ), health of the self ( $F(1, 63) = 8.96$ ,  $p < .01$ ), and health of the family members ( $F(1, 63) = 19.03$ ,  $p < .001$ ). There was no significant gender difference.

### *Stressful Life Events*

*Frequency.* Fifteen people did not report any SLEs. The number of people who did not report events did not vary by group or gender. The results remained the same whether or not these 15 individuals were included in the analyses. A group by gender

Table 3

*Means and Standard Deviations for Chronic Stress Domains*

Chronic Stress Domains	OBD ( <i>n</i> = 37)		Control Offspring ( <i>n</i> = 33)		<i>F</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Close Friendships	2.13	1.01	1.67	0.45	3.48
Social Life	1.94	0.61	1.80	0.40	0.40
Romantic Relationships	2.14	0.72	2.11	0.58	0.01
Family Relationships	2.42	0.65	1.81	0.54	12.08***
<b>Total Interpersonal</b>	8.69	2.07	7.39	1.05	6.38*
Education	2.40	0.57	2.33	0.67	0.64
Work	2.18	0.60	1.89	0.77	1.36
Finances	2.14	0.69	1.61	0.49	8.60**
Health of the Self	2.07	0.45	1.70	0.51	8.96**
Health of the Family	2.54	0.55	2.00	0.36	19.03***
<b>Total Non-Interpersonal</b>	11.27	1.68	9.56	1.57	16.00***
<b>Total Chronic Stress</b>	19.96	3.20	16.95	1.95	16.58***

Note. Analyses conducted with age as a covariate. OBD = Offspring of a parent with BD.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

ANCOVA revealed no group difference on the total number of events reported. Group by gender MANCOVAs yielded no difference in the frequency of independent, dependent, interpersonal, and non-interpersonal events (see Table 4). Overall, the offspring of parents with bipolar disorder did not report significantly more SLEs than offspring of parents with NMD. Analyses revealed no gender difference either. Therefore, our hypothesis that female participants and OBD experience more interpersonal SLEs was not supported.

*Severity.* We included all the participants when examining the severity of events. A group by gender ANCOVA revealed no group difference on the total severity of SLEs. Group by gender MANCOVAs were performed to examine the severity of independent, dependent, interpersonal, and non-interpersonal events; no group or gender differences were found.

Although there was no mean group difference in SLEs, it is possible that the OBD are more likely to experience moderate to severe life events than the offspring of parents with NMD. Therefore, data were recoded according to whether or not participants had experienced an event of moderate to severe negative impact in the last 12 months. Events scored 3 or above were categorized as moderate to severe (Goodyer, Kolvin, & Gatzanis, 1987). A stepwise logistic regression was used to predict the presence of moderate to severe SLEs. As independent variables, we used 1) age and the presence of an affective disorder, and 2) gender and group. The results (see Table 5) indicated that group status (Wald = 4.95; 1 *df*;  $p < .05$ ) significantly predicted the presence of at least one moderate to severe life event in the last 12 months. Odds ratio were used to estimate effect sizes. Offspring of parents with BD were found to be 3.19 times more likely to experience a

Table 4

*Means and Standard Deviations for Frequency and Severity of Stressful Life Events*

Stress Variables	OBD ( <i>n</i> = 37)		Control offspring ( <i>n</i> = 33)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<b>Episodic Stress- Frequency</b>				
Independent SLE	1.00	0.97	0.73	0.88
Dependent SLE	1.03	1.21	0.79	1.14
Interpersonal SLE	1.22	1.18	0.85	0.91
Non-Interpersonal SLE	0.81	0.94	0.67	0.89
<b>Episodic Stress- Severity</b>				
Independent SLE	3.00	2.91	1.82	2.29
Dependent SLE	2.43	3.00	1.73	2.74
Interpersonal SLE	3.26	3.11	1.89	2.11
Non-Interpersonal SLE	2.15	2.64	1.70	2.20

*Note.* OBD = Offspring of a parent with BD.

Table 5

*Logistic Regression Results: Predictors of the Presence of Moderate to Severe**Stressful Life Events*

Variable	B	Wald $\chi^2$	OR	95% CI	
				Lower	Upper
Presence of any moderate to severe SLEs					
Age	0.08	0.79	1.19	0.91	1.30
Presence of an affective disorder	-0.25	0.15	0.78	0.22	2.75
Gender	-0.22	0.18	0.80	0.29	2.24
Group	1.16	*4.95	3.19	1.15	8.85
Constant	-2.04	1.12	0.13		
Presence of moderate to severe interpersonal SLEs					
Age	0.19	3.21	1.21	0.98	1.49
Presence of an affective disorder	-0.18	0.07	0.84	0.22	3.20
Gender	-0.94	2.57	0.39	0.12	1.23
Group	1.28	*4.46	3.60	1.10	11.81
Constant	-4.56	*4.11	0.01		

Note. OR = Odds ratio; CI = Confidence interval.

\*  $p < .05$ .



moderate to severe life event in the last 12 months than offspring of parents with no mental disorder.

We repeated the logistic regression described above to predict the presence or absence of independent, dependent, interpersonal, and non-interpersonal moderate to severe SLEs. No predictor was significant for the analyses of independent, dependent, and non-interpersonal events. However, group was a significant predictor of interpersonal moderate to severe life event (Wald = 4.46; 1 *df*;  $p < .05$ ; see Table 5). The OBD were 3.60 times more likely to experience a moderate to severe interpersonal life event in the last 12 months than offspring of parents with no mental disorder. The percentages of offspring in each group who experienced a moderate to severe SLE are depicted in Figure 1, subdivided into types of stress.

## Discussion

The results of this study partially supported our hypotheses regarding stressful life events and chronic stress in the offspring of parents with BD. First, we hypothesized that offspring of parents with BD would experience deficits in multiple domains of functioning. To our knowledge, no previous study has examined chronic stress, as assessed with a clinician-administered interview, in the OBD. Consistent with our prediction, the OBD reported more interpersonal and non-interpersonal difficulties than the offspring of parents with NMD. With respect to the individual domains, the OBD had more chronic stress in the areas of family relationships, finances, physical health, and health of family members. The presence of chronic stress in family functioning is consistent with what we know about the family environment that is created by parents

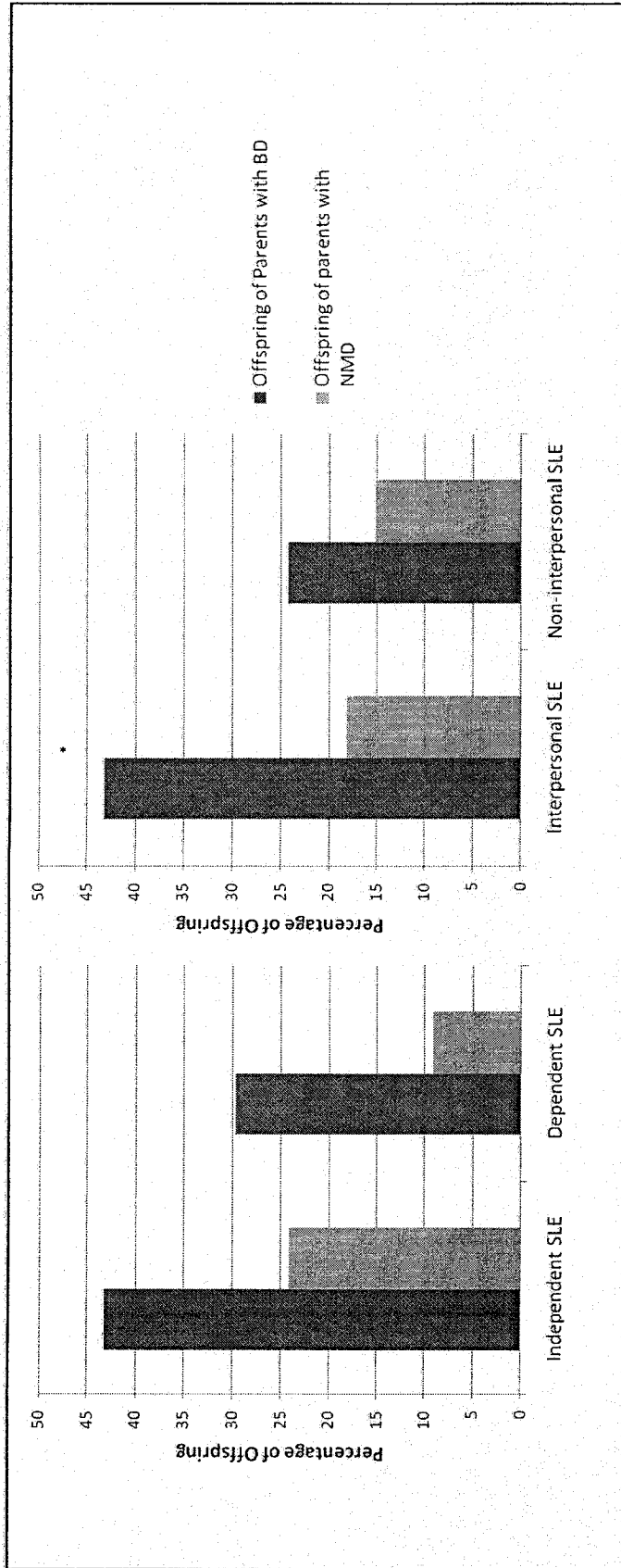


Figure 1. Percentage of OBD and control offspring who experienced at least one event of moderate to severe impact in the last 12 months, subdivided in independent, dependent, interpersonal, and non-interpersonal SLEs (stressful life events). Logistic regressions showed that the OBD are more likely to experience interpersonal events of moderate to severe impact than control offspring. \*  $p < .05$ .

with BD. Parents with BD tend to have higher neuroticism, less structured parenting skills, more negative interactions with their children, and overall, create a familial environment that is unstable (Chang et al., 2001; Ellenbogen & Hodgins, 2004; Hodgins et al., 2002; Inoff-Germain et al., 1992; Meyer et al., 2006; Romero et al., 2005).

We also found that the OBD's physical health was significantly worse than the health of control participants. Since the area of physical health excludes questions on mental health, the higher incidence of mental disorders in the BD group does not account for the finding. Rather, this domain examines eating habits, illicit drug, cigarette, and alcohol use, physical exercise, acute illnesses, and chronic physical conditions. Unfortunately, it is not possible for us to determine which of these areas of physical health is different between the groups. It is well known that psychopathology can influence physical health directly and indirectly (e.g., Katon & Ciechanowski, 2002; Morris & Mohammed, 2005). For example, in a study comparing individuals with BD, schizophrenia, or no mental disorder, the BD patients were more likely to report poor nutrition and exercise habits (Kilbourne et al., 2007). Also, BD and substance abuse are often comorbid disorders (Brady & Lydiard, 1992; Brown, 2005). Thus, physical problems are common in individuals with BD. However, in contrast to the wealth of research on mental health, the physical health of the OBD has received no empirical attention. The results of the present study and of another research group (De Genna, Stack, Serbin, Ledingham, & Schwartzman, 2006, 2007), indicate that a greater focus on indices of physical health among high risk populations may be important in understanding the transmission of risk across generations.

Although we do not have measures of SES or income in the offspring, we have previously found that that the parents with BD were characterized by lower income and lower levels of educational attainment than the parents having no mental disorder (Ellenbogen & Hodgins, 2004). Therefore, the financial situation of the BD families could account for the monetary difficulties reported by the OBD, but more research is needed to examine spending habits, risky behaviours, and education attainment in the offspring.

Studies that have examined chronic stress and impairments in different domains of functioning in the OBD are not easily comparable, as the methodology varies immensely from one study to the other. For example, one study (Henin et al., 2005) used Global Assessment of Functioning (GAF) scores, measures of special education placement, and information from the Kiddie-SADS diagnostic interview to examine impairments in daily functioning, while another one (Reichart et al., 2007) used information from the CBCL, a self-report questionnaire. Therefore, even though our results are in accordance with the former study, but not the latter, differences in methodology might explain this discrepancy. The measurement of stress using a clinical interview and objective ratings, which was used in the present study, is considered to have greater validity than self-report (Dohrenwend, 2006; McQuaid et al., 2000).

Our results were also consistent with those of studies examining depressed adolescents and offspring of depressed mothers, who experience more difficulties in the interpersonal realm than nondepressed children or children of parents with no mental disorder (Adrian & Hammen, 1993; Hammen & Brennan, 2001; Rudolph et al., 2000). It is important to note that our results remained significant after controlling for the presence

of affective disorders in the offspring, suggesting that risk status is associated with worse chronic functioning above and beyond the problems associated with having a diagnosis of affective disorder. At the same time, it is important to note that interpersonal difficulties in the OBD were restricted to family relationships, and that the offspring were functioning relatively well in the friendships and romantic relationships domains. Since the offspring of parents with major depression tend to have more global impairments in the interpersonal domains (Rudolph et al., 2000), our chronic stress results suggest that the OBD are, in fact, very different from the offspring of parents with major depression.

It is possible that the OBD who show impairments in functioning are in fact displaying a prodromal stage of a mood disorder. It is estimated that 30-50% of OBD will develop an affective disorder (Pauls, Morton, & Egeland, 1992). In retrospective and prospective studies, affected OBD exhibited premorbid impairment in functioning compared to non-affected OBD (Pelligrini et al., 1986; Reichart et al., 2007). It is thus possible that the poor functioning observed in the OBD represents a marker of the beginning of an affective disorder (i.e., a prodrome). Alternatively, poor functioning may represent a general risk factor for mood disorders, perhaps associated with environmental risk such as exposure to poor parenting practices and a chaotic family environment (Chang et al., 2001; Ellenbogen & Hodgins, 2004; Hodgins et al., 2002; Romero et al., 2005).

Our second hypothesis was that offspring of parents with BD would experience a greater number of, and more severe, episodic stressors that are interpersonal and dependent than the control offspring. This prediction was partially supported. Although the mean number and severity of interpersonal and dependent events did not differ by

group, the OBD were more likely to report SLEs that were moderate to severe in ratings of severity than controls. Few studies have examined SLEs specifically in the OBD. Adrian and Hammen (1993) have found that the OBD experienced marginally more dependent SLEs than controls. Duffy and colleagues (2006) found no difference in the number of SLEs reported by unaffected OBD and controls; however, the OBD who were diagnosed with a mental disorder reported more SLEs than the two other groups. Since we controlled for the presence of affective disorders in the current study, the present results are consistent with those of Duffy (2006). Our finding that the OBD and controls did not differ in the frequency of dependent events therefore does not support Hammen's (1991b) stress generation theory. Possibly, the stress generation theory may not be applicable to the OBD. In fact, Hammen's seminal study (1991b) on stress generation provided support for the theory in depressed women, but not in bipolar women, who did not differ from women with no mental disorders on the frequency of dependent SLEs. In the OBDs, results are mixed. The findings for parents with BD and their offspring therefore do not lend support to an intergenerational transmission of SLEs that are partly dependent on one's own behavior, as described in the families having a parent with major depression (Hammen, Shih et al., 2004). That is, it is plausible that the stress generation theory might apply only to individuals with depression and their offspring. Unique features associated with depression could be responsible for the theory's specificity, either directly through genetic influences, or indirectly, through other types of vulnerability factors. For example, depressed individuals have been found to have enduring negative beliefs and expectations about the self and others (Hammen, 2003), maladaptive family backgrounds (Hammen, Shih et al., 2004), and high levels of

neuroticism (Kendler et al., 2003), all of which could play a role in the generation of interpersonal stressors. This finding is consistent with our interpersonal chronic stress data, which suggest that the OBD have less interpersonal difficulties than the offspring of parents with major depression. More research is needed to identify markers of risk for mood disorders in the offspring of parents with major depression and the OBD.

Research in the OBD has not focused on severe life events per se, but there is some evidence that differentiating mild events from severe ones is important. It has been previously shown that exposure to at least one moderate to severe life event increases the risk of developing conduct disorder and emotional symptoms by a factor of three to six (Goodyer et al., 1987). Similarly, the risk for depression is 5.6 times higher following a major stressful life event (Paykel, 1979). Another study found that adolescents who developed major depression were more likely to have experienced two or more severe SLEs before the onset of the disorder than controls (Williamson et al., 1998). These findings and our results that OBD are almost four times more likely to experience moderate to severe interpersonal SLEs suggest that major life events should be an independent target of future studies on developmental psychopathology (Clark & Oates, 1995), as it might be an important risk factor for mood disorders.

Our third hypothesis was that girls, independent of their group, would experience more interpersonal SLEs than boys. This prediction was not supported; girls did not experience more interpersonal SLEs than boys, nor did they experience more severe ones. There was also no gender difference in the number or severity of non-interpersonal, independent, and dependent SLEs. This is inconsistent with the frequently-reported finding that adolescent girls experience more interpersonal stressful events than boys, and

that these stressors are related to their increased likelihood of becoming depressed (e.g., Kendler, Thornton, & Prescott, 2001; Rudolph & Hammen, 1999). Although the absence of gender difference is surprising in light of previous studies, it is less so when examining the diagnoses given to participants in the current project. In fact, out of the 31 diagnoses made in the entire sample, only nine were given to female participants. Possibly, the high prevalence of past and present psychopathology in male participants might have obscured typical gender differences. More research in high risk populations is needed to clarify this point.

Although we had not made specific hypotheses regarding gender differences in chronic stress, we did find that boys experienced more overall and non-interpersonal difficulties than girls. Although this is contrary to what has been observed in depressed adults (Nolen-Hoeksema, Larson, & Grayson, 1999) and adolescents with conduct disorder (Hastings, Anderson, & Kelley, 1996), it is consistent with Shih and colleagues' (2006) study, which used the same methodology as we did. They found that total chronic stress and non-interpersonal chronic stress was higher for 15 year-old boys of mothers with depression than girls; there was no gender difference for interpersonal chronic stress. Heubeck and O'Sullivan (1998) have also found that boys have a higher level of hassles than girls in the non-interpersonal domains such as school. Shih and her colleagues (2006) hypothesize that the discrepancy between the studies is due to the lack of differentiation between minor day-to-day hassles and more enduring stressful events, the latter being the focus of the Episodic Life Stress Interview used in the present study. It is important to note that there is a lack of research on chronic stress (Shih et al., 2006),



and our results highlight the importance of investigating both episodic and chronic stress in girls and boys in future studies.

There may be important consequences associated with high stress exposure in youth at risk for major affective disorder. It is well known that there are changes in the functioning of the HPA (hypothalamic-pituitary-adrenal) systems in persons with major affective disorder, such as elevated salivary cortisol (e.g., Daban, Vieta, Mackin, & Young, 2005; Holsboer, Lauer, Schreiber, & Krieg, 1995). We have previously found that the OBD in this sample secrete more cortisol during the day than controls, especially at 60 minutes post-awakening and at 1500h (Ellenbogen et al., 2006). Cortisol levels were not associated with self-report indices of psychosocial functioning as measured with the CBCL; however, the relationship between chronic stress using the UCLA Life Stress Interview and cortisol levels was not examined. Since elevated cortisol levels (Goodyer, Herbert, Tamplin, & Altham, 2000; Harris et al., 2000) and impairments in functioning (Pelligrini et al., 1986; Reichart et al., 2007) have been found to be associated with an increased risk for psychopathology, it is possible that the HPA axis functioning and chronic stress may be interrelated in our sample of OBD. Moreover, unaffected offspring of parents with major depression also show increases in morning salivary cortisol (Mannie, Harmer, & Cowen, 2007), suggesting that our finding of elevated cortisol is, in fact, not specific to the OBD. It is thus possible that elevated cortisol levels in high risk offspring may be a concomitant effect of environmental risk. The familial environment of high risk offspring could therefore contribute to impairments in functioning and HPA dysregulations, which, in turn, could increase the vulnerability to mood disorders in the offspring.

The present findings in the OBD may have important implications for the course of the illness in their parents. Indeed, it has been found that stress can lead to a recurrence or relapse of manic or depressive episodes in individuals with BD (Cohen et al., 2004; Hammen & Gitlin, 1997). Therefore, the OBD's stress and functioning can influence the environment of BD families and, in turn, the parent's stress level and risk for relapse. It has been suggested that psychoeducation for families with a depressed parent may be effective to decrease the problematic behaviours in the children (Beardslee & Gladstone, 2001). Similar interventions have been developed for families with a parent suffering from BD and have been shown to be effective in reducing relapse (e.g., Miklowitz & Otto, 2006).

There are several limitations to this study. First, the sample size, although larger than most samples in studies on the OBD, was still not large enough to detect smaller effects, such as the gender by group interaction. In addition, this sample size did not allow us to divide our groups into subgroups, which is very important in studies of high risk populations. There may be substantial differences in premorbid functioning between those high risk offspring who develop psychopathology and those who are resilient and remain unaffected (Ellenbogen, Young, Dean, Palmour, & Benkelfat, 1999).

Second, our sample ranged in age from 13 to 26 years old. Although we controlled for age in most analyses, it is important to note that the offspring in early adolescence do not experience the same types of SLEs as the offspring in early adulthood. Moreover, the number of SLEs increases with age during adolescence (Goodyer & Altham, 1991; Rudolph et al., 2000). It is thus possible that the large age

range may have decreased our ability to detect overall group differences in the number and severity of SLEs.

Third, we do not have recent data on parental functioning, such as number of hospitalizations and episodes, income, employment stability, social support, and so on. Since we found that the OBD experienced high levels of chronic stress in the family relationships, it would have been interesting to control for parental functioning in the analyses. Future data collection will include measures of functioning in BD and control parents, to better understand if the chronic stress in the OBD is due to their own behavior, or to the familial environment.

Finally, parents of this sample were mostly white, middle-class, and French Canadian adults who were treated for BD. Therefore, the generalizability of the results to other samples of OBD is questionable. For example, in the United States, approximately one third of people with BD are not being treated (Goodwin & Jaminson, 1990; Shapiro et al., 1984). Most of the parents with BD in the present sample were on psychotropic medications and were functioning adequately at present, suggesting a less chaotic family environment than in other studies of the OBD.

Future studies should implement a longitudinal design to better examine the association between stress and the development of psychopathology. Longitudinal studies could also inform us on the stability of stress over time as measured with the UCLA Life Stress Interview. Future studies should also pay special attention to chronic and episodic stress as both an independent and a dependent variable. We found that having a parent with BD was predictive of higher levels of stress. Other genetic or environmental variables, as well as interactions, predicting stress levels in the OBD should be a focus of

future research. At the same time, stress should also be used as a predictor to examine the consequences of high levels of chronic and episodic stress on physical and mental health. For example, it would be important to examine whether there is a link between different types of stress and the HPA dysregulation we have previously observed in the OBD. Successfully identifying the types of stress that are associated with clinical symptoms and early HPA dysregulation represents an important step towards the development of targeted preventive interventions in high risk populations.

### *Conclusions*

This study was the first to examine both chronic and episodic stress in a relatively large sample of OBD. We found that the OBD experienced more difficulties in different domains of functioning compared to offspring of parents with no mental disorder, even after controlling for the presence of affective disorders. The OBD were also more likely to experience interpersonal SLEs of moderate to severe intensity in the last 12 months. Overall, the findings do not support the stress generation theory in the OBD, which suggests that the theory may not apply to the etiology of affective disorders in families with BD. However, the present findings underline the importance of examining indices of chronic stress and major life events in high risk youth, as both may represent an important risk factor for the development of affective disorders.

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