REVIEW

Juvenile bipolar disorder and suicidality: a review of the last 10 years of literature

Natacha Halfon · Réal Labelle · David Cohen ·
Jean-Marc Guilé · Jean-Jacques Breton

Abstract Although children and adolescents with bipolar disorder (BD) are at elevated risk for suicide, little research to date has been conducted on suicidality in this population. The purpose of this descriptive review of the past 10 years of scientific literature on suicidality in youths with BD was to identify the risk and protective factors associated with this phenomenon, and to discuss the implications for research and clinical practice. Searches on *Medline* and *PsycINFO* databases for the period from early 2002 to mid-2012 yielded 16 relevant articles, which were subsequently explored using an analysis grid. Note that the authors employed a consensus analysis approach at all stages of the review. Four primary categories of risk factors for suicidality in youths with BD were identified: demographic (age and gender), clinical (depression, mixed state or mixed features specifier, mania, anxiety disorders, psychotic symptoms, and substance abuse), psychological (cyclothymic temperament, hopelessness, poor anger management, low self-esteem, external locus of control, impulsivity and aggressiveness, previous suicide attempts, and history of suicide ideation, non-suicidal self-injurious behaviors and past psychiatric hospitalization), and family/social (family history of attempted suicide, family history of depression, low quality of life, poor family functioning, stressful life events, physical/sexual abuse, and social withdrawal). Youths with BD who experienced more complex symptomatic profiles were at greater risk of suicidality. Few protective factors associated with suicidality have been studied among youths with BD. One protective factor was found in this descriptive literature review: the positive effects of dialectical behavior therapy. This article allows a better appreciation of the risk and protective factors associated with suicidality among youth with BD. Greater awareness of risk factors is the first step in suicide prevention.

N. Halfon (✉) · R. Labelle
Département de psychologie, Université du Québec à Montréal,
C.P. 8888, succursale Centre-ville, Montreal,
QC H3C 3P8, Canada
e-mail: halfon.natacha@courrier.uqam.ca; nhalfon@gmail.com

N. Halfon · R. Labelle
Centre de recherche et d'intervention sur le suicide et
l'euthanasie, Montreal, Canada

N. Halfon · R. Labelle · J.-J. Breton
Centre de recherche Fernand-Seguin, Montreal, Canada

N. Halfon · R. Labelle · D. Cohen · J.-M. Guilé · J.-J. Breton
Clinique des troubles de l'humeur et Service de recherche,
Hôpital Rivière-des-Prairies, Montreal, Canada

R. Labelle · J.-M. Guilé · J.-J. Breton
Département de psychiatrie, Université de Montréal,
Montreal, Canada

D. Cohen
Département de psychiatrie, Université Pierre et Marie Curie,
Paris, France

D. Cohen · J.-M. Guilé
Service de Psychiatrie de l'Enfant et de l'Adolescent du Groupe
Hospitalier Pitié-Salpêtrière, Paris, France

J.-M. Guilé
Centre de consultation et de cure ambulatoire,
Crépy-en-Valois, France

J.-J. Breton
McGill Group for Suicide Studies, Montreal, Canada

Introduction

Bipolar disorder (BD) in pediatric populations is a major public health problem affecting 1.8 % of the United States population according to a recent meta-analysis [1]. Adolescents with BD are at risk of death from suicide. Using a psychological autopsy protocol, Brent et al. [2, 3] investigated the prevalence of psychiatric disorders in adolescent suicide completers and suicidal inpatients; the authors found that 18–22 % of adolescent suicide completers presented bipolar symptomatology. Lewinsohn et al. [4] reported that twice as many adolescents with BD as those with major depressive disorder attempted suicide (44.4 vs. 22.2 %). A longitudinal study by Strober et al. [5] revealed that of a sample of 54 adolescents with bipolar-I disorder, 20 % had attempted suicide in the 5 years following recruitment. Slama et al. [6] found that the relationship between suicidality and BD was stronger when BD onset occurred before adulthood. Moreover, Carter et al. [7] demonstrated that in a sample of 320 patients with BD, who were aged 16–67 years, 56 % of patients with symptom onset after age 18 presented suicide ideation or had made one or more suicide attempts; the percentage increased to 74.5 % in patients with symptom onset prior to age 18.

Despite the elevated suicide risk in this population, little research to date has been conducted on suicidality and BD in children and adolescents. However, two literature reviews summarize the information available in the scientific writings. In their 2007 literature review, Jolin et al. [8] reported only nine studies that focused exclusively on risk factors for suicide in children and adolescents with BD; the authors reported 20 studies that focused on adult populations, despite the stated objective of exploring risk factors for suicidality in youth with BD. If the 2009 literature review by Goldstein [9] outlines the risk factors, it however does not discuss protective factors. Moreover, it does not provide specifics regarding issues linked with selected methodologies i.e., distinguish studies achieved with clinical samples from those with general population. Our objective was to conduct a descriptive review of scientific articles published from early 2002 to July 2012 on suicidality in children and adolescents with BD, to identify the risk and protective factors associated with this phenomenon, and to discuss research and clinical implications.

Methods

Conceptual framework

The definition of suicide adopted in this study refers to the following: (a) suicide attempt (SA) or suicide gesture (SG),

defined as any physically self-injurious act committed with some intent to die; (b) suicide plans (SP), which refers to an individual's strategy (such as time, place and means) to complete suicide, (c) suicide ideation (SI), which represents any thoughts about suicide, (d) thoughts of death, or the wish to die, (e) suicide threats (ST), or the verbal expression of any suicidal attempt, (f) suicide behaviors (SB), which include suicide attempts as well as suicide ideation and; (g) suicidality, which refers to all forms of suicide behaviors such as suicide attempts, suicide ideations but also suicide threats, thoughts of deaths and suicide plans.
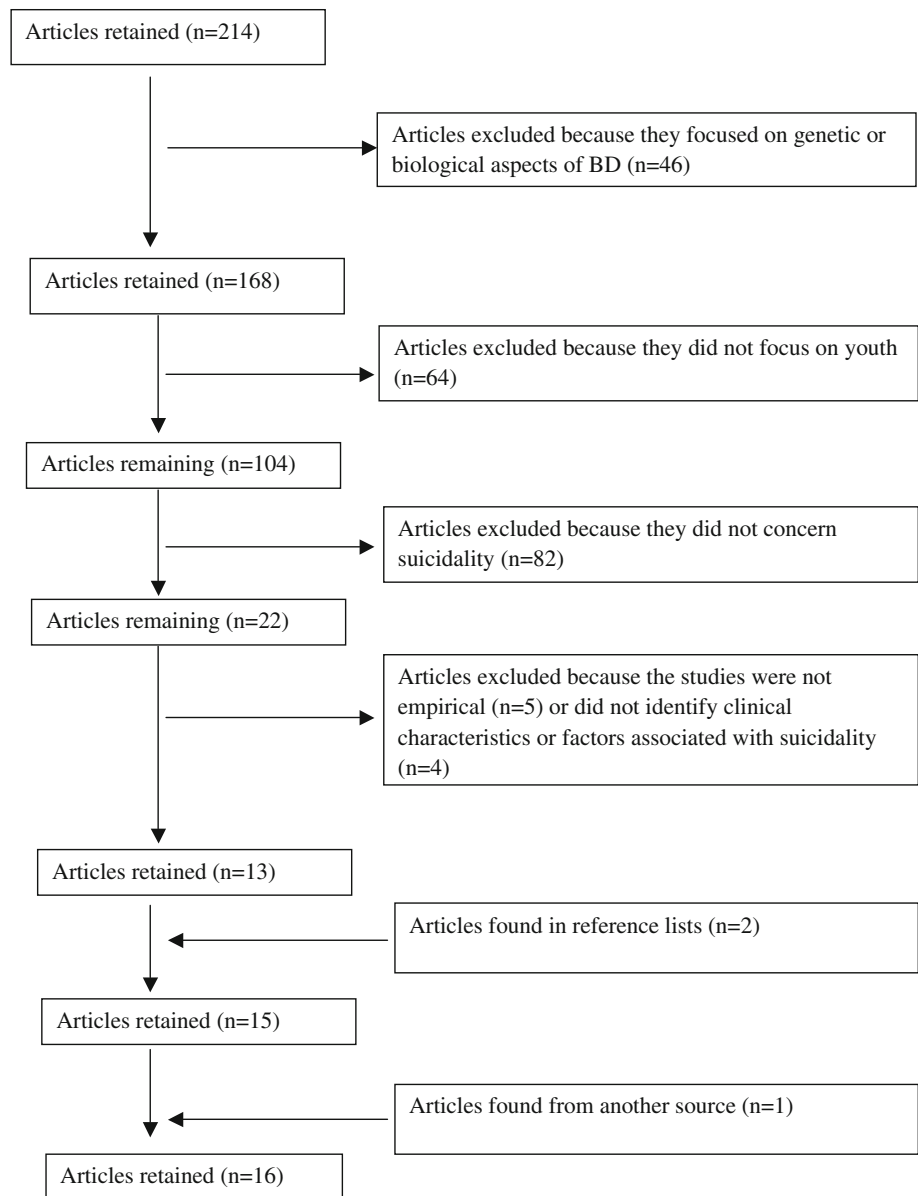
Article selection

We used the *Medline* and *PsycINFO* databases to identify relevant articles published between 2002 and mid-2012. Despite increased interest in BD in children and adolescents since the mid-1990s [10], very few studies that specifically examined suicidality in the juvenile bipolar population were published before 2000 [11]. We therefore decided to begin our literature review in 2002 when the study of suicidality in children and adolescents started to elicit a great deal of interest and with the goal to obtain current information on the subject. We began with the following selection criterion: articles published from January 2002 to July 2012 on BD and suicidality in children and adolescents.

For the research with Medline, we used the following search keywords: *Bipolar* and *Bipolar Disorder* and *suicid*, Humans, Child: 0–18 years, Preschool Child: 2–5 years, Adolescent: 13–18 years, Young Adult: 19–24 years*. An initial 393 articles were identified.

For the research with PsycINFO, the search keywords were: *Bipolar** (any field) and *Suicid*(any field)* and *Bipolar Disorder (any field), Childhood: birth to 12 years*, or *Neonatal: birth to 1 month*, or *Infancy: 2 to 23 months, or Preschool Age: 2 to 5 years, or School Age: 6 to 12 years* or *Adolescence: 13 to 17 years,* or *Young Adulthood: 18 to 29 years*. Through this second research, another 442 articles were identified.

Among those 835 articles (393 + 442), we read abstracts and selected 214 articles mainly focused on BD.

Next, articles were excluded if they focused primarily on genetic or biological aspects of the disorder, did not include youths, did not address suicidality, or did not identify clinical characteristics or factors associated with suicidality. Non-empirical studies were also excluded. Finally, the reference lists of all remaining articles were searched for further articles that met our selection criteria; two further articles were identified using this process.

Fig. 1 Article selection process

Sixteen articles were retained. See Fig. 1 for the article selection process.

Analysis grid

We separately analyzed each of the 16 retained articles and extracted relevant information using an analysis grid. The first section of the grid included general information: author(s), publication year, and country of origin of the author(s). The second section included information about study design, psychometric instruments, and sample size and type. The third section of the grid included results, i.e., clinical and psychosocial risk and protective factors associated with suicide behavior. Note that the authors employed a consensus analysis approach at all stages of the review.

Results

Of the 16 articles included in this review, 13 studies used clinical samples [11–23] and 3 studies used general population samples [24–26]. The characteristics of the studies and the findings concerning risk factors associated with suicidality for children and adolescents are presented in Tables 1 and 2, respectively. Of note is that eight studies investigated adolescents only.

Risk factors

Syntheses of the risk factors and the protective factors associated with suicidality in youths with BD are presented in Table 3. The studies analyzed in this review did not all

Table 1 Clinical studies of bipolar disorder and suicidality in youths

Study	Group (n)	Age	Suicidality rate and definition	Instruments of measure		Design/analyses	Results
				Suicidality	BP		
Algorta et al. [12] (USA)	BD-I (n = 27) BD-II (n = 18) BD-NOS (n = 45) Cyclothymic disorder (n = 48)	5–18	SA: 14 %; SI: 46 % *SA is defined as a self-injurious act that includes *some degree of seriousness* and lethality	K-SADS-PL DSM-IV	K-SADS-PL DSM-IV	Cross-sectional ANOVA	Mixed features are associated with SI and SA Family functioning and quality of life are associated with SA Severe depression and female gender predict suicidality. *Mixed features is defined as the presence if subthreshold symptoms from both opposing pole of BD*
Axelson et al. [13] (USA)	BD-I (n = 255) BD-II (n = 30) BD-NOS (n = 153)	7–17	SA: 31 %; SI: 76 % *SA: a self-injurious act that includes *some degree of seriousness and lethality*	K-SADS-PL DSM-IV	K-SADS-PL DSM-IV	Cross-sectional LR	BD-I, BD-II and BD-NOS do not differ where SI is concerned, but individuals with BD-I commit more SA than do those with BD-NOS
Birmaher et al. [14] (USA)	BD (n = 173)	7–17	No data *SA: a self-injurious act that includes *some degree of seriousness and lethality*	K-SADS-PL DSM-IV	K-SADS-PL DSM-IV	Cross-sectional ANOVA	BD adolescents commit more lethal SA than do BD children; higher rates in adolescent-onset than in childhood-onset BD
Caetano et al. [15] (USA)	BD (n = 43)	8–17	SI: 63 %; SP: 81 %; TD: 81 % No definition	K-SADS-PL DSM-IV	K-SADS-PL DSM-IV	Cross-sectional Chi-squared t test Mann–Whitney	Psychosis is associated with SI, SP and TD
Dilsaver et al. [16] (USA)	MDD (n = 242) BD (n = 100) n = 82 with MS	12–17	Among MS, 67 % had SI and 51 % had SA SA: any physically self-destructive act associated with the termination of life. *This act did not need to be serious from a medical perspective.*	SCID DSM-IV	SCID Medical report	Cross-sectional SLR	MS predicts SA and SI
Dilsaver et al. [17] (USA)	BD (n = 115) MDD (n = 140) CG (n = 58)	12–17	SI: 72 %; SA: 50 % SA: any physically self-destructive act associated with the termination of life. *This act did not need to be serious from a medical perspective.*	SCID DSM-IV	SCID Medical report	Cross-sectional SLR MLR	PD, OCD, social phobia predict SI in individuals with BD but not those with MDD
Goldstein et al. [11] (USA)	BD-I (n = 236) BD-II (n = 29) BD-NOS (n = 140)	7–17	SB: 42 %; SA: 38 %; CS: 5 % *SA : a self-injurious act that includes *some degree of seriousness and lethality*	K-SADS-PL DSM-IV	K-SADS-PL DSM-IV	Cross-sectional t test MLR SLR	SA is predicted by psychosis, MS, depressive episodes, PD, family history of SB, substance abuse disorder, adolescence, BD onset after age 12, presence of SI and self-injury, and prior SB. Individuals with BD-I commit more SA than do those with BD-NOS
Goldstein et al. [19] (USA)	BD-I (n = 7) BD-II (n = 2) BD-NOS (n = 1)	7–17	SA: 80 % before the DBT is administered	MSSI K-SADS-DRS	K-SADS-DRS	t test	Patients show from pre-to posttreatment of the DBT a significant improvement in suicidality.
Goldstein et al. [18] (USA)	BD-I (n = 154) BD-II (n = 25)	12–17	SA: 39 % *SA : a self-injurious act that includes *some degree of seriousness and lethality*	K-SADS-PL DSM-IV	K-SADS-PL DSM-IV	Cross-sectional LR	Substance abuse disorder is a risk factor for SA among adolescents with BD

Table 1 continued

Study	Group (n)	Age	Suicidality rate and definition	Instruments of measure		Design/analyses	Results
				Suicidality	BP		
Goldstein et al. [20] (USA)	BD-I (n = 244) BD-II (n = 28) BD-NOS (n = 141)	7–17	SA: 18 % *SA: a self-injurious act that includes *some degree of seriousness* and lethality	K-SADS-PL DSM-IV	Structured clinical interview DSM-IV	Longitudinal interval follow-up evaluation	At intake, suicidality is associated with severity of MDE, family history of MDD, being a girl, past psychiatric hospitalization, SI, SA, non-suicidal self-harm behaviors, global functioning, manic symptoms and substance abuse. At follow-up, suicidality is associated with more weeks with depression, mixed mood symptoms, psychotic symptoms, substance abuse and panic disorder
Kochman et al. [21] (France)	Time 1: MDD (n = 109) Time 2: BD (n = 35) among MDD (n = 80)	7–17	No data No definition	K-SADS-PL DSM-IV	K-SADS-PL DSM-IV	Prospective cohort Chi-squared Mann–Whitney	Cyclothymia is associated with SI and SA
Rende et al. [22] (USA)	BD-I (n = 255) BD-II (n = 30) BD-NOS (n = 153)	7–17	SA: 31 %; SI: 67 % No definition	K-SADS-PL DSM-IV	K-SADS-PL DSM-IV	Cross-sectional LR	Early-onset BD and adolescence predict SB
Rucklidge [23] (New Zealand)	BD (n = 24) CG (n = 39)	13–17	No data; SI was defined as either seriously considered suicide or had made attempts to kill themselves.	K-SADS-PL DSM-IV	Medical report	Cross-sectional ANOVA MANOVA	Hopelessness, low self-esteem, external locus of control, and poor anger management predict SA

ANOVA analysis of variance, *BD* bipolar disorder, *BD-I* bipolar-I disorder, *BD-II* bipolar-II disorder, *BD-NOS* bipolar disorder not otherwise specified, *CG* control group, *CS* completed suicide, *DSM-IV* Diagnostic and Statistical Manual of Mental Disorders (4th edition), *ICD-9* International Statistical Classification of Diseases and Related Health Problems (9th edition), *K-SADS-PL* Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version, *K-SADS-DRS* Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children-Depression Rating Scale, *LR* linear regression, *MANOVA* multivariate analysis of variance, *MDD* major depressive disorder, *MDE* major depressive episode, *MLR* multiple linear regression, *MS* mixed state, *OCD* obsessive–compulsive disorder, *PD* panic disorder, *SA* suicide attempts, *SB* suicide behaviors, *SCID* Structured Clinical Interview for DSM Disorders, *SCID-CV* Structured Clinical Interview for DSM Disorders-ClinicianVersion, *SG* suicide gestures, *SI* suicide ideations, *SLR* simple linear regression, *SP* suicidal planning, *TD* thoughts of death

assess the same risk and protective factors; for each factor, we have indicated the studies that documented this factor and its association with suicidality.

Demographic factors

Two demographic factors seem to influence suicide risk in youths with BD. First, clinical studies on juvenile BD demonstrated that age-at-onset of BD is relevant [25]. Goldstein et al. [11] and Rende et al. [22] reported more suicide attempts in individuals with BD onset after age 12. Lewinsohn et al. [25] reported that first suicide attempt occurred at a younger age for patients with BD than for patients with major depressive disorder (MDD). Adolescents with early-onset BD and those with late-onset BD presented a higher rate of suicide attempts than did children

with BD [11, 14]. Second, gender may be relevant in suicide among youths with BD. Algorta et al. [12] and Goldstein et al. [20] found that suicidality was significantly higher among girls, although Papolos et al. [26] reported no significant difference between girls and boys with BD in suicide threats according to parent reports (15 vs. 11 %), and Goldstein et al. [11] reported no effect of gender.

Clinical factors

The majority of the studies that focused primarily on clinical factors were methodologically rigorous. Where symptomatology is concerned, Axelson et al. [13] reported that prior suicide ideation did not differ across BD subtypes. However, a difference is noticed regarding suicide attempts as youths with bipolar-I disorder (BD-I) made

Table 2 General population studies of bipolar disorder and suicidality in youths

Study	Group (n)	Age	Suicidality rate and definition	Instruments of measure		Design/analyses	Results
				Suicidality	BD		
Bronisch et al. [24] (Germany)	TP (n = 3,021) Mania (n = 41) Hypomania (n = 55)	14–24	SA: 16 % SI: 34 % No definition	M-CIDI DSM-IV	M-CIDI	Cohort Chi-squared	Association between mania/hypomania and SI/SA
Lewinsohn et al. [25] (USA)	TP (n = 1,709) BD (n = 18) BS (n = 54) MDD (n = 294) No-MD (n = 233)	Adolescents	SA: 44 % No definition	K-SADS-PL DSM-IV DISC-IV CAPA CBCL CSI YMRS GBI HPS	K-SADS-PL DSM-IV	Cohort	First SA at younger age among individuals with BD than among those with MDD. Higher SA rate among individuals with BD. Age of onset influences SA
Papolos et al. [26] (USA)	BD (n = 2,479) (recruited via a website)	12–17	ST: 15 % No definition	CBQ	CBQ	Cross-sectional MLR	Hopelessness, social withdrawal, low self-esteem, stressful life events, anxiety, hallucinations, aggression, and impulsivity are associated with ST

BD bipolar disorder, *BS* bipolar symptoms, *CAPA* Child and Adolescent Psychiatric Assessment, *CBCL* Child Behavior Checklist, *CBQ* Child Bipolar Questionnaire, *CSI* Child Symptom Inventory, *DISC-IV* Diagnostic Interview Schedule for Children (4th edition), *DSM-IV* Diagnostic and Statistical Manual of Mental Disorders (4th edition), *GBI* General Behavior Inventory, *HPS* Hypomanic Personality Scale, *K-SADS PL* Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version, *M-CIDI* Munich-Composite International Diagnostic Interview, *MDD* major depressive disorder, *MLR* multiple linear regression, *No-MD* no mental disorder, *SA* suicide attempt, *SI* suicide ideation, *ST* suicide threats, *TP* total population, *YMRS* Young Mania Rating Scale

significantly more suicide attempts than did youths with BD not otherwise specified (BD-NOS) (35 vs. 21 %). These results are consistent with the results of two other studies. Goldstein et al. [11] reported a higher rate of suicide attempts in youths with BD-I than in youths with BD-II (bipolar-II disorder). Bronisch et al. [24] confirmed a significant relationship between mania and suicide behavior and, to a lesser extent, between hypomania and suicide behavior. However, Caetano et al. [15] and Goldstein et al. [20] found no difference between BD-I, BD-II and BD-NOS groups in prevalence of suicide ideation, thoughts of death, suicide plans and suicide attempts. According to Goldstein et al. [11], suicide risk increases with duration of the disorder.

Caetano et al. [15] found that youths with BD who presented psychotic symptoms were at greater risk for suicide ideation (94 vs. 42 %), thoughts of death (100 vs. 69 %), and suicide plans (65 vs. 15 %) than were youths with BD without psychotic symptoms. The same finding was observed for risk of suicide attempts [11]. Papolos et al. [26] observed that psychotic symptoms, primarily hallucinations, were very common among suicidal youths with BD; 80 % of youths who reported hallucinations

threatened suicide. However, Goldstein et al. [20] examined past, intake, and follow-up predictors of prospectively observed suicide attempts among 413 youths with BD. Regarding psychosis, Goldstein et al. [20] found no association with suicidality at intake but showed an association at follow-up.

Dilsaver et al. [16] reported that 67 % of 82 youths with mixed state reported suicide ideation. The authors estimated that the relative risk for suicide ideation was 1.65 times greater for girls with mixed state than for boys with the same condition. Moreover, 51 % of youths suffering from BD with mixed state (81 % of girls and 28 % of boys) had attempted suicide. The relative risk for suicide attempts was 2.8 times greater for girls presenting a mixed state than for boys presenting the same symptom. These results are consistent with those of Caetano et al. [15], who found that mixed states were very common in youths with BD who attempted suicide. Moreover, Algorta et al. [12] found that 79 % of youths with BD with mixed features reported lifetime suicide ideation and suicide attempts. Goldstein et al. [20] reported a proximal temporal association between prospectively mixed state and suicide risk among youths with BD. Indeed, the authors estimated that

Table 3 Risk and protective factors associated with suicidality in youths with bipolar disorder

Factors	Studies																
	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20] (at intake)	[20] (at follow-up)	[21]	[22]	[23]	[24]	[25]	[26]
Risk factors: age and gender																	
Adolescence	↑SA			↑SA												↑SA	
Female gender	↓ →SA	↑SB								↑SA			↑SB			↓	↓ →SA
Male gender	↓ →SA			↓ →SA												↓	↓ →SA
Risk factors: clinical characteristics																	
SI	↑SA		↑SA							↑SA							
SB	↑SA									↑SA							
Non-suicidal SIB										↑SA							
Past psychiatric hospitalization										↑SA							
BD-I	↑SA		↓ →SI / ↑SA		↓ →SA					↓ ←→SA					↑SA		
Psychotic symptoms	↑SI / ↑SA				↑SI / ↓ →SA					↓ ←→SA	↑SA						↑ST
Mixed states	↑SA	– / ↑SA			↑SA / –	↑SI / –				↓ ←→SA	↑SA						
Mixed features		↑SI															
–																	
Depressive episodes	↑SA	↑SB								↑SA	↑SA						↑ST
Manic episodes										↑SA	↓ ←→SA				↑SB		
Global functioning	↑SB									↑SA							
Anxiety symptoms										↓ ←→SA							
Panic disorder	↑SB						↑SI / ↓ →SA			↓ ←→SA	↑SA						↑ST
OCD							↑SI / ↓ →SA										
Social phobia							↑SI / ↓ →SA										
Substance abuse disorder	↑SA							↑SA		↑SA	↑SA						

Table 3 continued

Factors	Studies																
	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20] (at intake)	[20] (at follow-up)	[21]	[22]	[23]	[24]	[25]	[26]
Risk factors: psychological dimensions																	
Hopelessness														↑SA			↑ST
Lower self-esteem														↑SA			↑↓ST
Anger management														↑SA			
Aggressive/impulsive behaviors																	↑ST
External locus of control														↑SA			
Cyclothymia												↑SB					
Risk factors: family and social dimensions																	
Family history of SA	↑SB									↑SA							↑ST
Family history of depression										↑SA							↑ST
Social withdrawal																	↑ST
Stressful life events										←→SA							↑ST
Physical or sexual abuse	↑SA							↑SA		←→SA							
Poor family functioning		↑SB															
Poor quality of life		↑SB															
Protective factors																	
DBT									↓SA								

Articles numbers appear as they are in the reference section

BD bipolar disorder, *BD-I* bipolar disorder type I, *DBT* dialectical behavior therapy, *GF* global functioning, *Non-suicidal SIB* non-suicidal self-injurious behaviors, *OCD* obsessive–compulsive disorder, *SA* suicide attempt, *SB* suicide behaviors (SI + SA), *SI* suicidal ideation, *ST* suicide threats

↑, factors that increased suicidal risk; ↓, factors that decreased suicidal risk; ←→, factors that have no association

the more weeks the patient spent with mixed mood symptoms, the higher was the risk for suicide attempt.

Depressive episodes are common in youths with BD who have attempted [11] or threatened suicide [26]. Algorta et al. [12] found that suicidality was significantly greater in youths with more severe depression. Moreover, according to Goldstein et al. [20], severity of depressive episode is one of the most important predictors of suicide attempts among youths with BD at study intake. At follow-up, the study showed that suicidality was highly correlated with weeks spent with depression. Goldstein et al. [11, 20] and Algorta et al. [12] used the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children—Present and Lifetime Version (K-SADS-PL) to evaluate depressive symptoms while Papolos et al. [26] used the Child Bipolar Questionnaire.

Together, these findings indicate that suicidal youths with BD are likely to present an acute depressive state [11, 20], mixed state [15, 16, 20], manic episode [20, 24], or psychotic symptom [11, 15, 20, 26]. In our comparison of clinical studies and studies of the general population, psychotic and depressive symptoms are often present in both clinical and general populations, and that mixed state and greater overall BD severity are more common in clinical populations [11, 15, 17]. Goldstein et al. [11, 20] demonstrated that youths with BD were more prone to suicidality during the peak phase of the disorder as measured by impairment on the Global Functioning Scale.

Few studies reported specific data concerning comorbidity. Anxiety disorders [11, 17] and substance abuse disorders [11, 20] are associated with increased risk of suicidality in juvenile with BD. Papolos et al. [26] observed a relationship between suicide threats in youths with BD and symptoms typically associated with anxiety disorders. Panic disorder was found to be associated with increased suicide attempts and greater suicide ideation in youths with BD [11]. Obsessive–compulsive disorder and social phobia were also demonstrated to be associated with greater suicide ideation in youths with BD, but not in youths with major depressive disorder [17]. Goldstein et al. [20] found that the only comorbid axis I disorder at intake that differentiated attempters from non-attempters was substance use disorders. At follow-up, this study also identified panic disorder. Anxiety disorders were observed in both clinical and general populations [11, 16, 17]. In certain cases, anxiety may be associated with early onset of BD in suicidal youths and may constitute a key contributing factor to suicide behaviors in juvenile BD. Substance abuse is also common in youths with BD who have attempted suicide [11, 18, 20].

Where suicidality is concerned, suicide ideation [11, 13, 20] and suicide behaviors [11, 20] predict suicide risk in youths with BD. Indeed, 54 % of youths who attempted suicide had a history of suicide behaviors [11] and 67 % of suicide attempts were predictable by retrospective measurement of prior frequent and intense suicide ideation. Moreover, suicidal attempters had greater rates of non-suicidal self-injurious behaviors and past psychiatric hospitalization at follow-up [20].

Psychological factors

Findings concerning psychosocial risk factors for suicidality in juvenile BD are similar to those reported for suicidal adolescents suffering from depression [3, 27–29]. Suicidal youths with BD often report hopelessness, low self-esteem [23, 26], poor anger management [23], aggressive and impulsive behaviors [26], and an external locus of control, i.e., the tendency to attribute negative events to external forces (e.g., chance or the influence of others) [23].

Kochman et al. [21] indicated that cyclothymia is associated with suicidality in youths with BD. The authors found that a cyclothymic temperament in childhood predicted BD in adulthood. Cyclothymic temperament was defined as a personality trait characterized by significant mood swings, intense emotional reactions, impulsive and aggressive behaviors, and hypersensitivity; the authors adapted and validated the Cyclothymic-Hypersensitive Temperament Questionnaire to measure cyclothymic temperament. This temperament proved to be significantly associated with suicide ideation and suicide attempts in youths: 81 % of youths with a cyclothymic temperament reported at least one episode of suicide ideation, as compared to only 36 % of youths without a cyclothymic temperament. Moreover, a significantly greater proportion of children and adolescents with a cyclothymic temperament attempted suicide. The authors hypothesized that cyclothymia contributes to severity of juvenile BD.

Family and social factors

Goldstein et al. [11, 20] demonstrated that family history of attempted suicide predicted suicide behaviors in youths with BD. Goldstein et al. [20] showed that family history of depression emerged as a significant predictor of suicide attempts. However, history of major depression, mania, conduct disorder, substance abuse, and even completed suicide in a parent did not seem to contribute to the development of suicidality in bipolar youths. It should, however, be noted that those results are only based on the study of Goldstein et al. [11, 20]. Papolos et al. [26] found that social withdrawal was associated with suicide threats in youths with BD. Stressful life events also played an important role in suicidality [26], and it has been reported that many youths with BD who attempted suicide were victims of sexual or physical abuse [11, 18].

Algorta et al. [12] reported a relationship between suicide attempts and family dysfunctioning among youths with BD. Family dysfunctioning is defined as a potential disruption in family processes. The Family Assessment Device (FAD), which measures this notion [12], has a scale based on 27 different items. The authors found a high score on the FAD reflecting difficulties regarding family functioning in families of youths who had made a suicide attempt. Moreover, the same authors found a correlation between poor quality of life and increased suicidality.

Protective factors

This literature review revealed that few protective factors of suicidality have been studied among youths with BD. The only protective factor found in this literature review was the positive effects of dialectical behavior therapy (DBT) on patients. DBT was originally designed to treat patients with borderline personality disorder. This evidence-based psychotherapy focuses mainly on emotional dysregulation, tolerance of distress, acceptance, and mindful awareness. According to the 1-year exploratory open trial conducted by Goldstein et al. [19], adolescents with BD showed an absence of suicidality by the end of the treatment, although eight of the ten participants had a history of suicide attempts. After DBT therapy, the patients showed improvement in emotional regulation and depressive symptoms. As a consequence, having a better emotional regulation and fewer depressive symptoms help to decrease suicidality among youths with BD.

Moreover, we should also note that lithium has been established as an efficient drug in reducing suicidality among adults with BD [30, 31]. Indeed, Goodwin et al. [30] reported that frequency of suicide attempts and completed suicides was lower among patients treated with lithium than in those treated with divalproex; furthermore, the meta-analysis by Baldessarini et al. [31] of 31 studies found that suicide risk was five times lower in participants treated with lithium. While we cannot generalize this data to apply to youths, we can hypothesize that there would be a similar positive effect of lithium on suicide among youths with BD.

Discussion

Methodological limitations

Despite a recent increase in research on juvenile BD, risk and protective factors associated with suicidality remain under-studied. It is important to note that database searches for clinical trials regarding risk and protective factors associated with suicide behaviors among youths with BD revealed no new articles. Consequently, it will be essential for future studies to include suicidality as a variable in their research.

Most of the studies included in this review used a cross-sectional design, and very few tested specific hypotheses. Given that BD is characterized by recurring mood swings and a diachronic clinical profile, data on the temporal sequence of symptoms are critical in order to improve understanding of the disorder. As recommended by Hennen [32], longitudinal design should be prioritized, in order to analyze change over time and to take into account the recurrent mood swings that define BD. The five studies using a cohort design [11, 20, 21, 24, 25] show stronger association in terms of risk and protective factors associated with BD.

The primary instrument used to measure the presence of suicidality and the presence of BD in the studies reviewed here was the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children—Present and Lifetime Version (K-SADS-PL), a validated semi-structured interview designed to evaluate the presence of DSM-IV [33] criteria for BD in patients 6–18 years old [34]. Future studies would stand to gain from adopting a standard classification of suicide behaviors for a pediatric population as proposed by Posner et al. [35]. This classification was empirically validated. Indeed, the psychometric and validity analysis of the Columbia Suicide Severity Rating Scale (C-SSRS) demonstrated good predictive validity in determining participants with a high risk for a suicide attempt [36].

Finally, the generalizability of this review is limited because 6 of the 16 articles included in the review [11, 13, 14, 18, 20, 22] used data from the *Course and Outcome of Bipolar Illness in Youths* (*COBY*) study. Supported by the National Institute of Mental Health (NIMH), the COBY study is jointly conducted by the University of Pittsburgh, Brown University, and the University of California (Los Angeles). Although the COBY study is the largest study conducted on a pediatric bipolar population, the use of COBY data in multiple articles limits the generalizability of the findings of our review. Further, it must be noted that 81 % of the articles reviewed were published in the United States and caution must be exercised when applying results to other countries where there exist variations in cultural contexts and healthcare systems. Recently, Bellivier et al. [37], comparing two large samples of American and European bipolar patients, supported this hypothesis by showing a higher proportion of patients in the early-onset subgroup and the lower mean age-at-onset in the sample from the United States.

Research implications

Future research should be exploratory, including prospective descriptive and qualitative studies designed to improve

our understanding of the risk and protective factors associated with suicidality in this population. Such studies would allow a more accurate and detailed description of the phenomenon.

To ensure that future research in this area focuses on individuals accurately diagnosed with BD, studies should prioritize clinical populations and employ validated diagnostic measures such as the K-SADS-PL for diagnosing BD, and Posner et al.'s [35] classification for measuring suicidality. Moreover, a best-estimate diagnosis technique should be used since the clinical judgment of experienced psychiatrists may play an important role in diagnosing BD. Finally, longitudinal studies should be chosen instead of cross-sectional design studies.

Clinical implications

The results of this literature review indicate that suicide behaviors among children and adolescents with BD are influenced by four categories of risk factors: demographic (age and gender), clinical (depression, mixed state or mixed features specifier, mania, anxiety disorders, psychotic symptoms, and substance abuse), psychological (cyclothymic temperament, hopelessness, poor anger management, low self-esteem, external locus of control, impulsivity and aggressiveness, previous suicide attempts, history of suicide ideation, non-suicidal self-injurious behaviors and past psychiatric hospitalization), and family/social (family history of attempted suicide, family history of depression, low quality of life, poor family functioning, stressful life events, physical/sexual abuse, and social withdrawal). Youths with BD with more complex symptomatic profiles (mania, psychotic symptoms, mixed state, poor functioning) were at greater risk of suicidality. Moreover, adolescents with BD appear to be at a higher risk of suicidality than children with BD. Goldstein et al. [11] have proposed that this phenomenon is attributable to developmental stage, suggesting that adolescents have greater cognitive capacity, allowing them to plan and execute a suicide act. Risk factors associated with suicidality among youths with BD are inter-related, and a pattern of multiple risk factors increases vulnerability to further risk.

The results of this review revealed that little is known about factors that protect against suicidality in youths with BD. Indeed, the positive effects of DBT are the only protective factors associated with suicidality among children and adolescents with BD identified in this literature review. However, this result, while encouraging, should be regarded as preliminary since the study had no control group and included only ten individuals. Most research on suicide behaviors among patients with BD has been conducted in adults. In adults with BD, factors such as having strong reasons for living, having a high level of social support, or holding strong religious beliefs seem to provide some protection against suicidality [38–40]. Moreover, pharmacotherapy for BD usually involves mood stabilizers such as lithium or atypical antipsychotics [41, 42], but few drug treatments have been investigated for their potential positive impact against suicide. Lithium has become established as an efficient pharmacologic strategy for reducing suicidality [30, 43]. Mood stabilizers seem to also decrease suicidality rates among adults with BD [44]. Although no similar studies involving the pediatric population are available, two longitudinal naturalistic studies confirmed that lithium and mood stabilizers prevented, as in the adult population, symptomatic relapse in adolescents with BD [45, 46].

Conclusions

Youths with BD have a high risk of suicidality. This descriptive literature review underscores the importance of identifying risk factors and recognizing acute distress in youths with BD with suicide behaviors. Mental healthcare professionals (psychiatrists, psychologists, nurses, social workers, etc.) may wish to take an active role in the identification of at-risk youth, and increase vigilance regarding suicide when evaluating youths with BD. Greater awareness of risk factors is the first step in suicide prevention. The present review allows a better appreciation of suicide risk among youths with BD. However, more research is needed to provide a better understanding of suicide behaviors in children and adolescents with BD.

Conflict of interest None.

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