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The relation between childhood trauma and bipolar disorder, and the mediation effect of borderline traits

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Abstract

Objective: The relationship between childhood trauma and bipolar disorder (BD) is well-established. Extensive research has supported a firm linkage between the two variables, but illness course in bipolar patients is dependent on more factors than childhood trauma. Borderline personality disorder (BPD) and BD show a fair amount of overlap in symptomatology, which is why this study specified its focus on childhood trauma, BPD and BD. Based on previous research, the expectancy was that the relationship between childhood trauma and BD was mediated by symptoms of BPD.

Methods: Over the past two years, 188 patients at *Altrecht Bipolair* were asked to fill in two sets of questionnaires, in order to create a data file intended for scientific research. The sample used in this study consisted of 88 bipolar patients, currently in treatment at *Altrecht Bipolair*. They completed the SCID-I, and two sets of questionnaires about general anxiety and personality traits. The data that were used in the present study consisted of the Altman Self-Rating Mania Scale (ASRM), the Child Trauma Questionnaire (CTQ), the Dutch version of the Questionnaire for Characteristics of Personality (VKP-4) and the Quick Inventory of Depressive Symptomatology (QIDS).

Results: Regression analyses showed that all forms of childhood trauma that we assessed (emotional neglect and abuse and physical abuse), apart from emotional neglect, were significantly related to depression. This relationship was significantly mediated by BPD. However, the relationship between childhood trauma and mania appeared to be non-significant. BPD did not significantly mediate this relationship.

Conclusion: Childhood trauma appeared to be a predictor for depression, but not for mania. The relationship between childhood trauma and depression could be explained by BPD, whereas BPD did not mediate the relationship between childhood trauma and mania. Longitudinal research is needed to make firm conclusions about the relationship between childhood trauma and bipolar disorder and the mediation effect of BPD on this relationship, which could be generalized to other BD patients and clinical groups.

1.Introduction

Bipolar disorder (BD) can be defined as a recurrent disease that can appear with mania, hypomania or depression (American Psychiatric Association, 2013). The disorder is characterized by pathological mood disturbances that range from extreme mania to severe depression (Craddock & Sklar, 2013). Even though treatment for BD is advancing, there is a high recurrence rate (Gitlin, Swendsen, Heller, & Hammen, 1995) and after recovery patients still experience subsyndromal symptoms and functional impairments (Joffe, MacQueen, Marriott, & Trevor Young, 2004). Therefore, it is of great importance to understand predictors and vulnerability factors of BD. According to research, there are different premorbid vulnerabilities that can contribute to the development of BD, such as a family history of bipolar disorder (Craddock & Jones, 1999; Prendes-Alvarez & Nemeroff, 2016) and genetic heritability (Craddock & Jones, 1999; Lichtenstein et al., 2009; McGuffin, Rijsdijk, Andrew, Sham, Katz, & Cardno, 2003; Sklar et al., 2011). Negative life events, such as traumatic events, appear to predict pour illness course in patients with BD, including an increase in depressive symptoms (Johnson, Winett, Meyer, Greenhouse, & Miller, 1999), a higher recurrence risk (Hammen & Gitlin, 1997) and an increase in the duration of mood episodes (Johnson & Miller, 1997). Another risk factor, on which this study will partly focus, that could play an important role in the development of BD is childhood trauma. Childhood trauma, in the literature often referred to as child maltreatment, is defined as ‘’all forms of physical and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment, or commercial or other exploitation of children that results in actual or potential harm to a child’s health, survival, development, or dignity in the context of a relationship of responsibility, trust, or power’’ (Norman, Byambaa, Butchart, Scott, & Vos, 2012, p. 2). Four types of maltreatment are commonly distinguished: sexual abuse, physical abuse, emotional abuse, and emotional neglect (Norman et al., 2012). The harmful consequences of childhood trauma can result in detrimental consequences during infancy and childhood and it could furthermore trigger a negative developmental cascade continuing throughout the life course (Cicchetti, 2016). Evidence suggests that numerous experiences of childhood abuse and/or household dysfunctioning during childhood might result in harmful consequences on mental health in adulthood (Chapman, Whitfield, Felitti, Dube, Edwards, & Anda, 2004). Over the past years a fair amount of research has been done on the relation between childhood trauma and BD. According to extensive research the relationship between childhood trauma and BD is firmly established (Marangoni, Hernandez, & Faedda, 2016; Perna, Vanni, Di Chiaro, Cavedini, & Caldirola, 2014; Watson et al., 2014); both retrospective and longitudinal research has supported this relationship (Gershon, Johnson, & Miller, 2013). Gershon et al. (2013) assessed chronic stressors and exposure to trauma in bipolar I patients, whose illness course was followed for a time period of 24 months. Childhood trauma is a broad concept and covers multiple different forms of trauma.

Research has shown that all types of traumatic experiences, apart from sexual abuse, were common in bipolar disorder (Watson et al., 2014) and according to other research emotional abuse and physical abuse are the most common traumas in bipolar disorder (Garno, Goldberg, Ramirez, & Ritzler, 2005; Ödzin et al., 2017). Therefore, in this study the focus was on emotional and physical abuse and neglect.

Personality is an essential variable that has to be taken into account when it comes to the relation between childhood trauma and BD. Besides the firm link between childhood trauma and BD, there appears to be an important relation between childhood trauma and dysfunctional personality traits/personality disorders. Childhood maltreatment represents a potent environmental risk factor for personality pathology (Cohen et al., 2014) and it increases the risk of personality disorders (Bierer et al., 2003). Therefore, it is of great importance to pay attention to the relation between childhood trauma and dysfunctional personality traits/personality disorders. Research has pointed out that emotional abuse was independently associated with paranoid, schizotypal, borderline and cluster C personality disorders; emotional neglect was independently associated with histrionic and borderline personality disorder (Lobbestael, Arntz, & Bernstein, 2010). Furthermore, research has shown that there is a clear relationship between childhood trauma and borderline personality disorder (BPD) (Ibrahim, Cosgrave, & Woolgar, 2017).

In addition to the earlier mentioned established relationships, important research has been done on the link between dysfunctional personality traits/personality disorders and the development or existence of BD. Personality disorders appear to be common in patients with mood disorders (Friborg et al., 2014). They represent one of the most important factors in vulnerability to mood disorders (Scott et al., 2000) and having a comorbid personality disorder is a top risk factor for a poor prognosis outcome (Holzel et al., 2011; Skodol et al., 2011). According to extensive research, a firm association exists between BD and personality disorders (George, Miklowitz, Richards, Simoneau, & Taylor, 2003; Grant et al., 2008). Both cluster B and C personality disorders are frequently seen in BD (Friborg et al., 2014). BPD is a personality disorder showing quite some overlap with BD and in turn, BPD and BD often co-occur (Aguglia, Mineo, Rodolico, Signorelli, & Aguglia, 2017). For instance, affective lability is a trait that is seen in both BPD and BD, which may account for the high frequency of comorbidity for the two disorders (Henry et al., 2001).

Because childhood trauma negatively affects character traits and dysfunctional personality traits have, in turn, been found to impair treatment outcome in BD (Perna et al., 2014), it is questioned whether the link between childhood trauma and BD is mediated or moderated by dysfunctional personality traits or personality disorders. Previous findings suggest that personality traits have a mediator effect on the relationship between childhood abuse and BD (Perna, Vanni, Di Chiaro, Cavedini, & Caldirola, 2014).

According to Okubo et al. (2017) personality traits play a key role as a mediator for the relationship between childhood abuse and depressive symptoms in schizophrenia, which might indicate a mediation effect of personality traits on the relationship between childhood trauma and BD, since depression is an important component of BD and because BD shows overlap (genetic risk factors and clinical features) with schizophrenia (Arango, Fraguas, & Parellada, 2013). Since there has been done a lot of research showing overlap between and co-occurence of BD and BPD (Aguglia et al., 2017), the focus in this study will be on BPD. Based on the previously discussed literature regarding BPD and its relation to childhood trauma and BD, it is hypothesized that BPD has a mediating effect on the relationship between childhood trauma and BD.

In sum, the aim of this study was to acquire more knowledge about the relationship between childhood trauma and BD and the mediating effects of dysfunctional personality traits/personality disorders on this specific relationship. Firstly, it was expected that depression and mania in BD would be predicted by both childhood trauma and BPD, and that BPD would be predicted by childhood trauma. Secondly, it was hypothesized that BPD has a mediating effect on the relationship between childhood trauma (emotional abuse and neglect and physical abuse and neglect) and BD.

2.Method

2.1 Participants

The sample that has been used in this study consists of 88 patients who are currently in treatment at *Altrecht Bipolair* (Altrecht Bipolar), an outpatient institute for specialized mental health care for patients with bipolar disorder. The dataset has been obtained in the period from July 2015 to December 2017, by asking patients to fill in two sets of questionnaires after having completed the intake procedure. Among the 180 patients that were asked to complete the questionnaires, 88 patients actually completed measures forming the sample included in this study. The sample consisted of 36 men and 52 women, having an age ranging from 21 to 65 (M = 40.74, SD = 11.63). Among 88 patients, 60 patients were diagnosed with bipolar I disorder, whereas 15 patients had the diagnosis bipolar II disorder. The remaining 13 patients who were neither diagnosed with bipolar I nor bipolar II disorder, mainly were given a diagnosis of major depressive disorder. Concerning comorbidity, substance use disorder (N = 15) and anxiety disorders (N = 9) were most common. There were 64 patients who did not have any comorbid disorders.

2.2 Measures

The intake procedure at Altrecht Bipolar consists of an intake interview with one of the psychiatrists, followed by a 3-hours Structural Clinical Interview for DSM Disorders (SCID-I). Among the

questionnaires that patients had to fill in after they completed the intake procedure, are the Altman Self-Rating Mania Scale, the Child Trauma Questionnaire, the Questionnaire for Characteristics of Personality and the Quick Inventory of Depressive Symptomatology. In order to examine the link between child trauma and BD and the possible mediation effect of BPD on this linkage, these four questionnaires were analyzed in this study.

2.2.1 Structural Clinical Interview for DSM Disorders (SCID-I). The SCID-I (First, Spitzer, Gibbon, & Williams, 1995) was used to assess all comorbid Axis-I psychiatric DSM-5 disorders that patients can suffer from (Gershon et al., 2013) and thoroughly provides information about the mood symptoms that are present within an individual. Based on the acquired SCID-I information in combination with the diagnosis made by the psychiatrist, patients are given a final DSM-5 diagnosis. Additionally, apart from the bipolar I/II diagnosis, patients can be diagnosed with one or more comorbid DSM-5 disorders.

2.2.2 Altman Self-Rating Mania Scale - NL (ASRM-NL). The Altman Self-Rating Mania Scale (ASRM) was developed by Altman, Hedeker, Peterson, and Davis (1997). Renes and Kupka (2009) developed a Dutch translation of this questionnaire (ASRM-NL), which was used in this study. The ASRM-NL consists of five items providing information about the current (past week) manic symptoms (Raes, Ghesquiere, & Van Gucht, 2012). The five items assess the main manic symptoms; ‘’increased cheerfulness, inflated self-confidence, talkativeness, reduced need for sleep and excessive behavioral activity’’ (Raes et al., 2012, p. 2). Each question consists of a 0-4 scale, with each item providing an increasingly severe description of a specific statement (Raes et al., 2012). Scores can range from 0 to 20, with scores of ≥ 6 indicating more probability of the presence of mania or hypomania and scores of ≤ 5 indicating no presence of manic symptoms. (Renes & Kupka, 2009). According to Altman et al. (1997) the questionnaire has good psychometric properties and has a strong correlation with clinician-administered ratings. Figure 1 provides an overview of the number of patients being non (hypo)manic and (hypo)manic at the time of assessment.

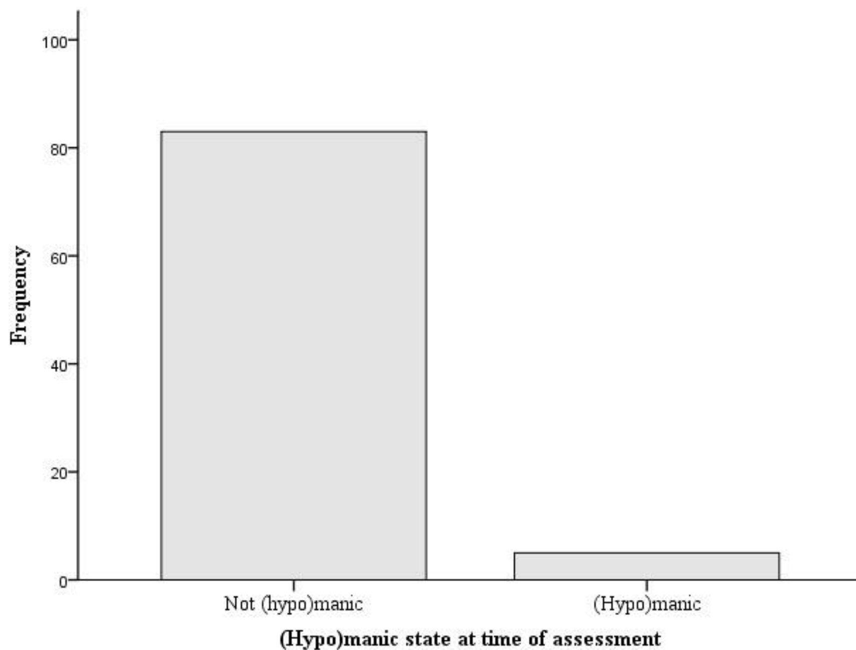

Figure 1. Number of patients in (hypo)manic and non (hypo)manic state at the time of assessment

2.2.3 Childhood Trauma Questionnaire (CTQ). In this study the Dutch version of the Childhood Trauma Questionnaire (CTQ), the '*Jeugd Trauma Vragenlijst*', was used. The questionnaire was developed by Arntz and Wessel in 1996 and consists of 28 questions concerning childhood experiences, identifying whether a patient has been victim of trauma in his/her childhood. Patients can choose an answer on a 5-point Likert scale (1 = never true to 5 = very often true) that mostly aligns with their answer. Total CTQ scores can range from 25 to 125, with higher scores indicating exposure to multiple forms of childhood abuse and neglect and its severity (Viola, Salum, Kluwe-Schiavon, Sanvicente-Vieira, & Levandowski, 2016). Among the 28 questions, there are 25 clinical items and 3 validity items. The 25 items are subdivided in 5 categories, tapping emotional abuse, physical abuse, sexual abuse, physical neglect and emotional neglect, respectively. Cut off scores were identified for each subscale; emotional abuse (12), physical abuse (9), sexual abuse (7), physical neglect (9), emotional neglect (14), which can be used to identify patients most likely to have a history of child trauma (Thombs, Bernstein, Lobbestael, & Arntz, 2009). In the present sample, 15 patients scored higher than the cut off score on emotional abuse, 7 patients scored higher than the cut off score on physical abuse, 84 patients scored higher than the cut off score on physical neglect and 28 patients scored higher than the cut off score on emotional neglect. The CTQ showed good convergent validity (Lobbestael, Arntz, Harkema-Schouten, & Bernstein, 2009). Bernstein et al. (2003) reported good internal consistency reliability for each of the CTQ scales.

2.2.4 Questionnaire for Characteristics of Personality. The Dutch version of the Questionnaire for Characteristics of Personality, *Vragenlijst voor Kenmerken van de Persoonlijkheid* (VKP-4), was developed by (Duijsens, Eurlings-Bontekoe, & Diekstra, 1996) and used in this study in order to acquire more information about the presence of the eleven personality disorders (PD) of the DSM-IV (Egberink & Vermeulen, 2000) Paranoid PD, Schizoid PD, Schizotypal PD, Antisocial PD, Borderline PD, Theatrical PD, Narcissistic PD, Avoidant PD, Dependent PD, Obsessive-Compulsive PD and Passive-Aggressive PD or presence of dysfunctional personality traits, according to the DSM-IV. The VKP-4 is a self-administered questionnaire, consisting of 197 questions (Courtois et al., 2014). Each item has four different answer possibilities; 'true', 'false', '?' or 'not applicable', relating to the past five years (Courtois et al., 2014). Additionally, 15 items covering the general PD criteria are included. Every single personality disorder is measured at three different levels:

- The categorical diagnosis (positive/probable/negative). The categorical diagnosis is 'positive' when 4 or 5 criteria for a certain PD are met. When 3 criteria are met, a 'probable' diagnosis should be made. A 'negative' diagnosis is made when patients only meet two criteria or less than two criteria.
- The categorical score: the number of criteria for each PD that has been met.
- The dimensional score: a sum score for each PD (sum score of both questions answered with 'true' and questions answered with '?'). Sum scores for each PD differ, since a different number of questions are asked for each PD. For BPD, the possible sum score ranges from 0 to 40, with higher scores representing stronger BPD symptom severity.

The VKP-4 shows good construct validity (Egberink & Vermeulen, 2000). The focus in this study was on BPD, which is why only the sum scores of BPD questions were taken into account.

2.2.5 Quick Inventory of Depressive Symptomatology - Self Rating (QIDS-SR). The QIDS-SR was developed by Rush et al. (1986). The questionnaire consists of 30 items and was designed to assess all DSM-IV core criteria symptom domains of depression (Rush et al., 2006). The questions have to be answered by the particular patient, relating to a time frame of seven days before the assessment. All nine symptom criteria for major depressive disorder (MDD), based on the DSM-IV (American Psychiatric Association, 1994), and additional common MDD symptoms are included (Trivedi et al., 2004). Total scores, which were used in this study, can range from 0 to 84, with scores of ≤13 indicating non-depressive cases, 14 to 25 indicating mild depression, 26 to 38 indicating moderate depression, 39 to 48 indicating marked depression and scores of ≥49 indicating severe depression (Trivedi et al., 2004). In order to acquire more insight in the severity of the depressive episodes in patients with BP, this questionnaire was included in this study. The QIDS-SR shows strong internal consistency and construct

validity and provides a reliable overview of cognitive changes, suicidal ideation, hopelessness, mood disturbances, quality of mood, and anxiety symptoms (Leverich et al., 2001). According to Rush, Gullion, Basco, Jarrett, and Trivedi (1996) a satisfactory internal consistency was found in a sample of 456 patients, with a Cronbach's alpha of $\alpha = .94$. The distribution of the sample to the different QIDS severity groups is presented in Figure 2.

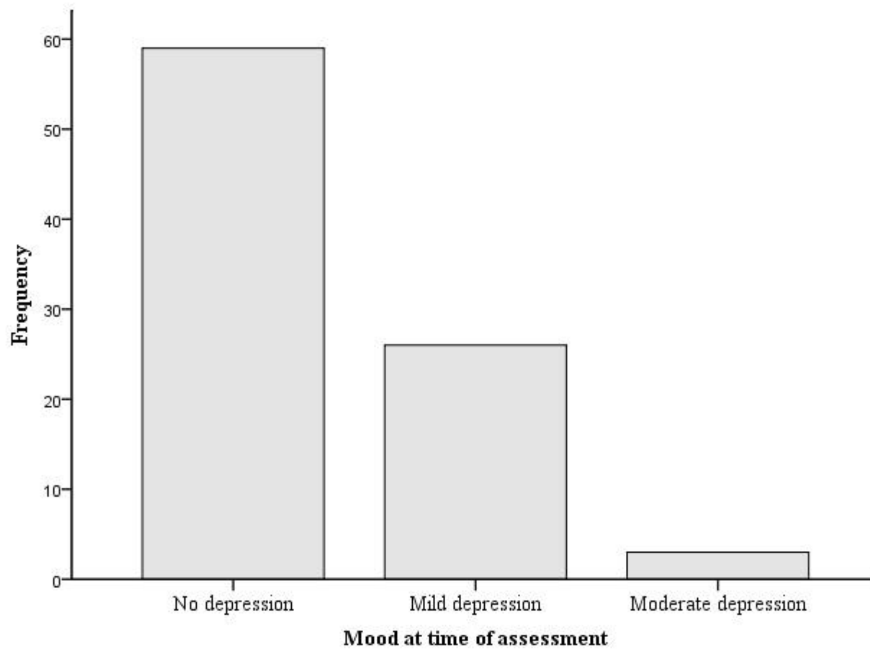

Figure 2. Distribution of the sample to the different QIDS severity groups

2.3 Procedure

All participants of the sample used in this study have been referred to this healthcare institute over the past two years. They all started with an intake procedure. After having completed both the intake and the SCID-I, the patient filled in two sets of online questionnaires. The first set is about general anxiety and mood symptoms. The other set is about personality characteristics. Like mentioned earlier, not all of the questionnaires were analyzed in this study. Only the most relevant questionnaires concerning the main question relating child trauma, dysfunctional personality traits and bipolar disorder have been taken into account.

2.4 Statistical analyses

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0. Outliers were detected by performing boxplots. Scores outside the 1.5 interquartile range (1.5xIQR) were replaced

by the highest non-deviating scores. Four outliers were found on the CTQ total score and the VKP-4 total score. Missing data were handled by mean substitution. Firstly, to examine whether or not there was a direct linkage between all variables, five regression analyses were computed for; child trauma and depression, child trauma and mania, child trauma and BPD, BPD and depression and BPD and mania. Secondly, to address the hypothesis, eight mediation analyses were computed; mediation analyses for four subscales of the CTQ (emotional abuse, physical abuse, and emotional neglect and physical neglect) and mediation analyses for two outcome measures of BD (QIDS, ASRM), with BPD as the mediating variable in each mediation analysis. In order to evaluate mediation, PROCESS tool, version 2.16 (Hayes, 2012) was used. A significance level of $\alpha < .05$ was used. To evaluate the significance of the results of the mediation analyses, the focus was on the bias corrected and accelerated confidence interval (Bca CI). When zero is not included in the interval, indirect effects are considered as being significant, with $p < .05$.

Regarding the outliers, only the four outliers on both the CTQ total scores and the VKP-4 total scores were replaced by the highest non-deviating scores, like described above. However, on the CTQ subscales multiple outliers were detected. In order to provide results that are as reliable as possible, the analyses were computed on both the data file with CTQ subscale outliers and the data file without CTQ subscale outliers. No significant differences were found between those two data files, which is why the output of the analyses computed on the original data file (with outliers on the CTQ subscales included) was used for the interpretation of the results.

3. Results

3.1. Regression analyses

To address the first expectancy that BD would be predicted by childhood trauma and BPD, and that BPD would be predicted by childhood trauma., five regression analyses were computed. Secondly, eight mediation analyses were computed to examine the mediation effect of BPD on the linkage between childhood trauma and BD. In the regression analyses, total scores of child trauma, BPD, depression and mania were used. In the mediation analyses, emotional neglect, emotional abuse, physical neglect and physical abuse were the four independent variables that were used, the total score of BPD was the mediating variable in each mediation analysis and total scores of depression and mania were the outcome variables.

Model 1 was a model in which the relation between child trauma and depression was tested. Results from this regression showed that child trauma significantly predicted depression, $b = .304$, $t(86) = 2.954$, $p = .004$, $R^2 = .092$, $F(1, 86) = 8.762$, $p = .004$ (Table 1).

In model 2 the linkage between BPD and depression was tested. Results from the regression analysis showed that BPD significantly predicted depression scores, b = .404, t(86) = 4.096, p = .000, R^2 = .163, F(1, 86) = 16.776, p = .000 (Table 1).

Model 3 was a model in which the relation between child trauma and BPD was tested. Results from the regression analyses showed that child trauma significantly predicted BPD scores, b = .354, t(86) = 3.512, p = .001, R^2 = .125, F(1, 86) = 12.331, p = .001 (Table 1).

Table 1. Summary of the significant regression analyses.

Model	Predictor variable	Outcome variable	β	t	df	p	R^2	F
1	Child trauma	Depression	.304	2.954	1, 86	.004	.092	8.762*
2	BPD	Depression	.404	4.096	1, 86	.000	.163	16.776*
3	Child trauma	Depression	.354	3.512	1, 86	.001	.125	12.331*

Note: *Significant point estimate (p <.05).

3.2. Mediation analyses

Regarding the mediation analyses, some interesting results were found. As shown in table 2, model 4 was a model which tested the mediation effect of BPD on the linkage between CTQ total scores and depression. Results show that this relationship was significantly mediated by BPD, b = .100, BCa CI [.040, .196].

Model 5 tested the mediation effect of BPD on the association between emotional neglect and depression. Outcomes in table 2 show that a significant effect was found for the mediation effect of BPD on the relation between emotional neglect and depression, b = .128, BCa CI [.043, .269].

Model 6 was a model in which the mediation effect of BPD on the association between emotional abuse and depression was tested. Outcomes in Table 2 indicate that BPD was a significant mediator of the linkage between emotional abuse and depression b = .172, BCa CI [.067, .355].

Model 7 was a model in which the mediation effect of BPD on the association of physical neglect with depression was tested. Outcomes in Table 2 indicate that the mediation effect of BPD on the linkage between physical neglect and depression was non-significant b = .071, BCa CI [-.188, .357].

Model 8 was a model in which the mediation effect of BPD on the association of physical abuse with depression was tested. Outcomes in Table 2 indicate that BPD was a significant mediator of the relation between physical abuse and depression b = .097, BCa CI [.003, .309].

Both regression analyses and mediation analyses for child trauma (total scores and scores on its subscales), BPD and mania appeared non-significant. However, in order to provide the most complete representation of the results from the present study, the non-significant results of the regression and mediation analyses with mania as outcome measure (measured with the ASRM) are included as supplementary material in the appendix (appendix 1).

Table 2. Summary of mediation analyses.

Model	I	M	O	Total effect	Direct effect	Unique indirect effect	Bias corrected and accelerated 95% CI	
							Lower	Upper
4	CTQ Tot	BPD	Dep	.2526	.1529	.0999*	.0403	.1963
5	Emo Neg	BPD	Dep	.3596	.2317	.1279*	.0426	.2685
6	Emo Ab	BPD	Dep	.4537	.2816	.1721*	.0671	.3550
7	Phy Neg	BPD	Dep	.7006	.6292	.0714	-.1876	.3566
8	Phy Ab	BPD	Dep	.3905	.2936	.0969*	.0034	.3086

Note: *Significant point estimate ($p < .05$). In this table 'I' stands for independent variable, 'M' stands for mediating variable and 'O' stands for outcome variable and with 'CTQ Tot' stands for CTQ total scores, 'Emo Neg' stands for CTQ subscale emotional neglect, 'Emo Ab' stands for CTQ subscale emotional abuse, 'Phy Neg' stands for CTQ subscale physical neglect and 'Phy Ab' stands for CTQ subscale physical abuse.

4. Discussion

The present study provides an overview of the linkage between child trauma and bipolar disorder (BD) and the extent to which this linkage is mediated by borderline personality disorder (BPD). Firstly, based on previous research showing that both child trauma and BPD are strongly related to BD (Etain et al., 2010; Perna, Vanni, Di Chiaro, Cavedini, & Caldirola, 2014; Watson et al., 2014) and based on research showing a firm linkage between child trauma and BPD (Ibrahim, Cosgrave, & Woolgar, 2017), the expectancy in this study was that BD would be predicted by both child trauma and BPD, and that there would also be a predictive relationship between child trauma and BPD. The main hypothesis that was addressed concerned the mediating effect of BPD on the association between child trauma and BD, based on research of Perna et al. (2014) that supported the mediation effect of personality traits on the linkage between child trauma and BD. The findings of this study are discussed below.

Firstly, a significant relationship was found between child trauma and depression, which is in line with findings from previous studies showing that childhood trauma was strongly related to higher risks of development of recurrent and persistent depressive episodes (Nanni, Uher, & Danese, 2012). Secondly, consistent with studies showing that child trauma is strongly associated with BPD (Sansone, Hahn, Dittoe, & Wiederman, 2011; Laporte, Paris, Guttman, Russell, 2011), child trauma and BPD were significantly related in the present study. Thirdly, BPD and depression appeared to be significantly related, which is in line with results from previous research on this relationship (Abela, Payne, & Moussaly, 2003). Both linkages between child trauma and mania and BPD and mania appeared to be non-significant. These findings partly support the expectancy that the variables of the mediation model are strongly interconnected and indicate that especially the depression component of BD is clearly related to child trauma and BPD.

With regard to our main hypothesis that BPD has a mediating influence on the relationship between child trauma and BD, some clear results were found. Among the four linkages between the CTQ-subscales (emotional neglect and abuse, physical neglect and abuse) and depression, three of them (emotional neglect and abuse and physical abuse) appeared to be significantly mediated by BPD. These findings are in line with research results that demonstrated that characteristics of BPD significantly mediated the link between child trauma and suicide potential (Allen, Cramer, Harris, & Rufino, 2013), a phenomenon often seen in depression. However, among the four linkages between the CTQ-subscales and mania, no significant mediating effects of BPD were found.

In conclusion, the results showed that depressive episodes in BD can partly be accounted for by child trauma and BPD, whereas the manic episodes in BD cannot be predicted by either child trauma or BPD. In addition, BPD appears to have a mediating effect on the relation between child trauma and depressive episodes in BD, apart from the relation between CTQ-subscale physical neglect and depression. The relation between child trauma and manic episodes in BD appear not to be mediated by BPD.

An important question that arises from these results concerns the explanation of the absence of a significant mediating effect of BPD on the relation between child trauma and mania. Firstly, the absence of this effect could be attributed to the fact that it is highly plausible that patients did not expose any kind of manic symptoms at the time of filling in the questionnaires. In most cases, patients who were asked to fill in the questionnaires were (slightly) depressed or stable, which could explain the absence of an effect for manic symptoms. As shown in Figure 1, only five patients reported (hypo)manic symptoms, whereas 29 patients reported mild to moderate depression (Figure 2). Furthermore, an important explanation for the absence of this effect could imply the patient’s unawareness of his/her (hypo)manic symptoms, which

is a common phenomenon in patients who go through a (hypo)manic episode. Quite often (hypo)manic patients are convinced that their divergent behavior and/or disrupted mood is not different from their normal behavior/mood, which is why their answers on the questionnaires could have been biased (Gazalle et al., 2007). Apart from the aforementioned explanations, there is, at this point, no clear explanation for the absence of a linkage between childhood trauma and mania, BPD and mania and a mediation effect of BPD on the linkage between childhood trauma and mania.

An important limitation to this study was its cross sectional design. No causal relationships could be determined, because data only referred to one specific moment in time, whereas longitudinal research would have provided more insight in the course of the illness and in possible causality between variables, by following BD patients over time. A longitudinal research could have been of great value in this particular sample, since BD patients can experience extreme mood swings (Belmaker, 2004) and constantly switch from depressed mood, to neutral mood, to manic mood: one specific moment in time is never representative for a patient's bipolar illness severity. Therefore, the results of the present study have to be interpreted with caution. Another limitation to this study, which adds to the first one, is the generalizability of the study results. Since the results come from a cross sectional research, which does not provide reliable and valid enough results (since patient's mood at the time of data collection is not representative of their mood over time), they cannot be generalized to other bipolar patients. Furthermore, the sample consisted of 60 BD I patients and 15 BD II patients, which means that BD I patients are overrepresented in comparison to BD II patients. This overrepresentation indicates implications for the generalizability of the results to BD II patients. The symptomatology in BD I is more severe than in BD II and therefore, the generalization of the present results to BD II patients remains limited. Regarding the generalizability of the study results, we can state that people who have experienced child trauma are more prone to develop depressive symptoms, and that this linkage can be explained by borderline personality traits. However, it remains questionable whether such a statement can be generalized to all people who experience child trauma or depressive symptoms, since the present study includes a sample consisting of people suffering from severe mental illness and often multiple comorbid disorders, whereas other clinical samples might expose less severe problems. Therefore, the generalizability of the results is questionable.

In order to make clear conclusions about the mediation model of child trauma, BPD and BD, a longitudinal research on the mediating effect of BPD on the relation between child trauma and BD would be recommended to future studies on these topics. Furthermore, with regard to future research, it would be of great additional value to make use of a staging model. Clinical staging is a concept that gives insight in prognosis, clinical course and treatment (Berk et al., 2014). By staging, a patient can be placed on a continuum of increasing potential severity, ranging from clinically at-risk stage through a first episode of

illness and finally to a severe end-stage of the disease (Berk et al., 2014). Categorizing BD patients into different stages would provide a more reliable and valid outcome measure for BD, compared to time specific questionnaires like the QIDS and ASRM that were used in the present study.

Regarding the clinical implications arising from this study, some important recommendations could be taken into account. Firstly, since child trauma appears to be a potential predictor of depression, it could be of great importance to illness course if special attention and specific treatment for child trauma was included in protocol treatment for depressed/bipolar patients. In addition, if patients are diagnosed with depression or BD and they are being treated for both depression/BD and child trauma, the present results point out that BPD could be interfering with this treatment. Therefore, when both depression/BD and child trauma are present within an individual, it might be extremely helpful to pay specific attention to the possible presence of BPD or borderline personality traits. Concerning the diagnostic process that bipolar patients go through, it could be essential to take child trauma into account during the diagnostic process, so that treatment could be adapted in its early stages.

The current research contributed to provide specific and important information about the linkage between child trauma and BD and the extent to which this linkage could be explained by BPD. According to the results, it might be essential to focus on child trauma and BPD in treatment of depression/BD, in order to make treatment as efficient as possible. However, results have to be interpreted with caution. Longitudinal research is needed to make firm conclusions about the relationship between childhood trauma and bipolar disorder and the mediation effect of BPD on this relationship, which could be generalized to other BD patients and clinical groups.

Appendix

Non-significant results from regression and mediation analyses.

Table 3. Summary of the regression regression analyses between child trauma and mania (measured with the ASRM) and BPD and mania.

Model	Predictor variable	Outcome variable	*β*	*t*	*df*	*p*	R^2	*F*
9	Child trauma	Mania	.048	.447	1, 86	.656	.002	.200
10	BPD	Mania	.087	.812	1, 86	.419	.008	.659

Note: *Significant point estimate (*p* <.05).

Table 4. Summary of mediational analyses.

Model	I	M	O	Total effect	Direct effect	Unique indirect effect	Bias corrected and accelerated 95% CI Lower	Upper
11	CTQ Tot	BPD	Mania	.0105	.0043	.0062	-.0096	.0267
12	Emo Neg	BPD	Mania	.006	-.0023	.0082	-.0094	.0337
13	Emo Ab	BPD	Mania	.0252	.0154	.0098	-.0160	.0487
14	Phy Neg	BPD	Mania	-.1643	-.1688	.0045	-.0093	.0546
15	Phy Ab	BPD	Mania	.0153	.0097	.0055	.0062	.0373

Note: *Significant point estimate (*p* <.05). In this table 'I' stands for independent variable, 'M' stands for mediating variable and 'O' stands for outcome variable and with 'Emo Neg' stands for emotional neglect, 'Emo Ab' stands for emotional abuse, 'Phy Neg' stands for physical neglect and 'Phy Ab' stands for physical abuse.

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