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Childhood trauma and the likelihood of increased suicidal risk in schizophrenia

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ABSTRACT

The aims of the present study were to investigate the dimensions of childhood trauma (CT) in patients with schizophrenia, and to predict suicidal risk (e.g., current suicidal ideation and lifetime suicide attempts) by CT dimensions and clinical factors (positive and negative symptoms and depression). Eighty-two inpatients with schizophrenia completed the Childhood Trauma Questionnaire-Short Form (CTQ-SF), the Beck Depression Inventory-II (BDI-II), and the Beck Scale for Suicide Ideation (BSSI); they were also administered the Positive and Negative Syndrome Scale (PANSS).The presence of lifetime suicide attempts was assessed by structured diagnostic clinical interview. Patients with lifetime suicide attempts scored higher on sexual abuse than those without attempts after controlling for depression severity. Patients with high suicidal risk had higher scores on physical neglect than those without high risk after controlling for depression severity. Patients with high CT had higher scores on negative and positive symptoms, current suicidal ideation, and depression than those with low CT. Logistic regression analyses indicated that sexual abuse was a unique predictor of lifetime suicide attempts, and that physical neglect and depression were unique predictors of current suicidal ideation. These findings indicate that patients with schizophrenia who have experienced CT may be at increased risk for suicide.

1. Introduction

In patients who develop schizophrenia, childhood trauma (CT) may be associated with suicidal risk. Suicide is one of the leading causes of death in patients with schizophrenia (Tarrier et al., 2013). It has been shown that among patients with schizophrenia 4–13% die by suicide, and 50% experience both suicidal thoughts and suicide attempts (Pompili et al., 2007; Simms et al., 2007). Recent evidence has reported that the prevalence of current suicidal ideation or lifetime suicide attempts is 20.5–69.9% in schizophrenia (Harvey et al., 2018; López-Díaz et al., 2018; Bani-Fatemi et al., 2019). Numerous clinical and sociodemographic factors have been found to be related to suicide in schizophrenia, including young age, male gender, being single, poor treatment adherence, long illness duration, history of hospitalization, using antipsychotic drug, substance use disorder, lifetime suicide attempts, family history of suicide attempts and psychiatric disorders, hopelessness, and lack of social support (Pompili et al., 2009; Palmier-Claus et al., 2013; Fleischhacker et al., 2014; Nordentoft et al., 2015; Barrett et al., 2015).

CT encompasses several aspects of maltreatment during childhood including physical abuse (harm to a child by parents or caregivers from physical assault such as cuts, fractures, and bruises), sexual abuse (abuse of a child by an individual in a sexual act in order to obtain physical or financial satisfaction), emotional abuse (adverse patterns of parents' or caregivers' behaviors toward a child such as belittling, humiliating, and ridiculing), emotional neglect (parents' or caregivers' failure to provide the child with emotional support, love, psychological care, and affection), and physical neglect (parents' or caregivers' failure to provide for the child's physical needs such as suitable food, clothing, shelter, medical care, and school) (Bernstein et al., 2003). CT has been found to be a vulnerability factor for developing schizophrenia and psychotic symptoms (Read et al., 2005; Morgan and Fisher, 2007; Kelleher et al., 2008; Harley et al., 2010; Heins et al., 2011; Thompson et al., 2016). It is associated with both positive and negative symptoms

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and depression (Duhig et al., 2015; Isvoranu et al., 2017). Studies have reported that CT is associated with poor response to treatment and social competency in schizophrenia (Hassan and De Luca, 2015; Matheson et al., 2017; Mørkved et al., 2018; McGregor et al., 2018). CT may also associated with lead to biological alterations such as hypothalamic-pituitary-adrenal (HPA) axis disturbances, elevated release of glucocorticoids, and decreased cortisol awakening response (CAR) (Misiak et al., 2017). Further, individuals with psychosis who have experienced CT may be highly sensitive to future life stress (Lardinois et al., 2011). Given these adverse outcomes, CT is possibly related to suicide in schizophrenia (Li et al., 2015).

The research on associations between different domains of CT and suicidality in schizophrenia patients has yielded inconsistent findings. Although there are studies that find no association between CT and a history of suicide attempts (Togay et al., 2015), others find that all dimensions of CT are associated with attempts (Roy, 2005). Other studies find that a history of suicide attempts is associated with all CT dimensions except for physical neglect (Hassan et al., 2016), while other studies find that aspects of neglect are indeed associated (Xie et al., 2018; Prokopez et al., 2018). Finally, some authors find that sexual abuse is most strongly associated with suicidality in schizophrenia patients (Ucok and Bikmaz, 2007; Conus et al., 2010; Bani-Fatemi et al., 2016), a finding that is often reported with other clinical and non-clinical populations (Fergusson et al., 2013; Jakubczyk et al., 2014; Velloso et al., 2016; Daray et al., 2016; Stewart et al., 2015; Khosravani et al., 2017). Although there is clearly an association between childhood maltreatment and both past suicide attempts and current suicidal ideation, this association may be confounded by the severity of other clinical symptoms in patients with schizophrenia. There is evidence that, in schizophrenia patients, there are significant associations among CT, suicidality, depression, positive and negative symptoms (Siris, 2000; Smith et al., 2006; Van Dam et al., 2015).

Numerous studies have shown that schizophrenia patients who have high levels of positive symptoms are at high risk for suicidality (Saarinen et al., 1999; Tarrier et al., 2006; Taylor et al., 2010). Also, it has been found that depression and positive symptoms predict suicidal ideation in patients with schizophrenia (Bornheimer, 2016). There is, however, no overall agreement on the association between negative symptoms and suicide. On the one hand, some studies have reported that negative symptoms are protective factors against suicide risk (Schwartz-Stav et al., 2006; Tarrier et al., 2007). On the other hand, other studies have found negative symptoms to be positively associated with suicidal ideation (Tarrier et al., 2004; McGirr et al., 2006; Umut et al., 2013; Yan et al., 2013; Luckhoff et al., 2014), while still other studies have reported no associations between negative symptoms and suicide risk (Hawton et al., 2005).

These contradictory findings may be due to methodological characteristics such as small sample size, the use of heterogeneous samples of patients with schizophrenia (patients with recent onset schizophrenia or adolescents with schizophrenia comorbid with post-psychotic depression) or mixed samples of inpatients and outpatients. Much of the literature on suicidality in patients with schizophrenia considers either childhood maltreatment, or current levels of clinical symptoms, but few consider multiple predictors at once. The goal of the current study was to determine the extent to which all of these clinical and psychological factors (all dimensions of CT, depression, negative and positive symptoms) distinguish between schizophrenia inpatients with and without a lifetime history of suicide attempts, and between those with and without current suicidal ideation.

The specific aims of the present study were: (1) to test the significance of differences between patients with high and low CT in terms of positive and negative symptoms, current suicidal ideation, and depression; (2) to determine the extent to which patients with and without current suicidal ideation, and those with and without lifetime suicide attempts, differ in terms of CT dimensions and clinical factors, and to determine whether any associations persist even after controlling for current severity of depression; and (3) to predict current suicidal ideation and lifetime suicide attempts from CT dimensions and clinical factors. Based on the above-mentioned studies, we hypothesized that patients with high CT would have more severe psychotic symptoms, suicidal ideation, and depression than those with low CT (hypothesis 1), dimensions of CT, depression, positive and negative symptoms would be significantly more severe in patients with current suicidal ideation, and in those with a lifetime history of suicide attempts (hypothesis 2), and that CT dimensions, depression, and positive and negative symptoms would predict current suicidal ideation and lifetime suicide attempts (hypothesis 3).

2. Methods

2.1. Participants

Patients were involved in the present study if they met the following criteria: had a DSM-IV-TR diagnosis of schizophrenia, a current hospitalization, were aged between 18–59 years, were literate, and accepted to participate in the study. Patients were excluded if they had: an intellectual disability; a diagnosis of psychosis NOS or psychosis stemming from a medical condition, neurological or physical illness, or from intellectual disability; substance use; or an active psychosis, defined as score of 4 or higher on at least one of the positive scale items of the PANSS (Kay et al., 1987): item 1 (delusions), item 3 (hallucinatory behavior), item 5 (grandiosity), item 6 (suspiciousness) or general scale item 9 (unusual thought content). A total of 168 inpatients with schizophrenia were randomly recruited from Rahnema Psychiatric Inpatient Center in Tehran, Iran. In accordance with exclusion criteria, eighty two patients (age range = 18–59 years) were eligible and included in the study. Psychiatric diagnoses were assessed by a clinical psychologist (F.S.B) according to the Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Patient version (SCID-I/P; First et al., 2001). Age at onset, illness duration, and family histories of lifetime suicide attempts and Axis I psychiatric disorders were collected from patients' psychiatric records. An experienced clinical psychologist evaluated participants' lifetime suicide attempts during the SCID-I/P; an actual suicide attempt was defined as including deliberate self-harm, and/or hospitalization due to suicidal self-injury.

All patients with schizophrenia were taking antipsychotic medications at the time of assessment. Participants signed the written informed consent and they were studied in accordance with the 1989 revision of the Helsinki Declaration.

2.2. Measures

The Childhood Trauma Questionnaire – Short Form (CTQ-SF; Bernstein and Fink, 1998, 1994): The CTQ-SF contains 28 items to assess CT dimensions including sexual abuse, physical abuse, emotional abuse, physical neglect, and emotional neglect. The internal consistency of the CTQ-SF has been found to be adequate (Bernstein et al., 2003). In this study, we used the cut-off scores used by Walker et al. (1999a, 1999b, 1999c) to define the individuals with high and low CT. A CTQ-SF total score ≥ 46 shows individuals with high CT and a CTQ-SF total score ≤ 46 denotes individuals with low CT. For individual CT dimensions, a score ≥ 8 denotes patients with high levels of sexual abuse, physical abuse, and physical neglect; a score ≥ 10 indicates patients with high levels of emotional abuse; and a score ≥ 15 indicates patients with high levels of emotional neglect. In the present study, we used the Persian version of the CTQ-SF (Garrusi and Nakhaee, 2009), which has demonstrated acceptable internal consistency (Cronbach's alpha = 0.89) (Ghorbani et al., 2019). Cronbach's alpha for the scale was 0.90 in the current study.

The PANSS (Kay et al., 1987): The PANSS is a semi-structured interview conducted by trained researchers who provide ratings for 30 symptoms. This scale is widely used to assess positive and negative

symptoms, as well as other symptoms, in schizophrenia. Ghamari Givi et al. (2010) showed that this scale has a five-factor structure in Iranian patients with schizophrenia which resembles the factor structure of the original scale. These authors also found that the scale had acceptable construct validity in these patients.

The Beck Depression Inventory-II (BDI-II; Beck et al., 1996): The BDI-II is a 21-item self-report questionnaire to examine depression severity during the past week. The BDI-II total score ranges from 0 to 63. The reliability and validity of the BDI-II have been confirmed to be appropriate (Beck et al., 1998). The Persian version of the BDI-II (Ghassemzadeh et al., 2005), with Cronbach's alpha equal to 0.91 (Khosravai et al., 2019a), was used in the present research. Cronbach's alpha for the scale in the present study was 0.93.

The Beck Scale for Suicide Ideation (BSSI; Beck et al., 1979): The BSSI self-report scale has 19 items to evaluate suicidal risk. According to cut-off scores, a BSSI total score ≤5 shows low suicidal risk and a BSSI total score ≥6 indicates high suicidal risk (Sokero et al., 2003). In this study, the Persian version of the BSSI (Esfahani et al., 2015) was used whose Cronbach's alpha was reported as 0.95 (Khosravani et al., 2019b). In the current study, the Cronbach's alpha of the scale was 0.94.

2.3. Statistical analyses

Analyses of variance (ANOVA) was used to compare the severity of CT dimensions, depression, psychotic and negative symptoms between patients with and without lifetime suicide attempts, and between those with and without current suicidal risk; ANCOVA was used to control for the severity of the patients' depression. The power analysis for the comparison between the groups was computed using the effect sizes (partial η^2) considered to be small ($\eta^2 > 0.01$), medium ($\eta^2 > 0.06$), and large effects ($\eta^2 > 0.14$) for variables. Patients with high and low CT were compared using *t*-test for negative and positive symptoms, current suicidal ideation, and depression. Pearson's correlations were used to examine the associations between current suicidal ideation and the different CT dimensions, positive and negative symptoms, and depression; partial correlations were used to test the same correlations while controlling for depression. Logistic regression analyses with the forward conditional method were performed to test for associations with lifetime suicide attempts (0 vs. 1 or more attempts) and current suicidal ideation (absent vs. present). The reliability of the scales was assessed using Cronbach's alpha. Data were analyzed using SPSS-22 for Windows (IBM Corporation, Armonk, NY, USA). There were no missing values. The significance level was set at $p < 0.05$, and all tests were two-tailed.

3. Results

Table 1 shows the demographic and clinical characteristics of patients with schizophrenia including: illness duration (mean = 9.01 years), being single (37.8%), married (39.0%) or divorced (23.2%), depressive symptoms on the BDI-II (mean = 17.62), and family histories of suicide attempts (19.5%) and psychiatric disorders (43.52%). There were 34 patients (41.5%) with a lifetime history of suicide attempts, including 11 (13.4%) who had one attempt and 23 (28.1%) had two or more attempts.

The results of the current study showed that current suicidal ideation was significantly associated with lifetime suicide attempts ($r = 0.43$, $p < 0.001$); the association was attenuated, but still significant, when controlling for depression severity ($pr = 0.26$, $p < 0.01$).

Table 2 presents the results of comparing patients with high and low CT and its dimensions. Based on the CTQ-SF cut-off scores, 39% of patients had significant levels of CT. For the specific dimensions of CT, many patients reported having significant levels of emotional abuse (45.1%), physical abuse (40.2%), sexual abuse (32.9%), emotional neglect (39.0%), and physical neglect (52.4%). As shown in Table 2, the comparison between patients with high and low CT (on total scores and on all dimensions) showed that patients with high CT scored significantly higher on negative and positive symptoms, current suicidal ideation, and on depression than those with low CT.

Table 1
Demographic and clinical characteristics of patients with schizophrenia ($n = 82$).

Characteristics		*N* (%) or mean ± SD
Gender		
	Male	34 (41.5%)
	Female	48 (58.5%)
Age, years		34.78 ± 9.10
Education level, years		9.85 ± 3.61
Marital status		
	Single	31 (37.8%)
	Married	32 (39%)
	Divorced	19 (23.2%)
Age at onset, years		25.71 ± 7.92
Illness duration, years		9.01 ± 6.06
Family history of suicide		
	Yes	16 (19.5%)
	No	66 (80.5%)
Family history of psychiatric disorders		
	Yes	43 (52.4%)
	No	39(47.6%)
History of lifetime suicide attempts		
	Yes	34 (41.5%)
	No	48 (58.5%)
Depression score on the BDI-II		17.62 ± 12.95

Note. BDI-II: Beck Depression Inventory-II.

Table 3 presents the results of the ANOVAs and ANCOVAs comparing patients with and without a history of suicide attempts, and with and without current suicidality. Patients with a history of suicide attempts had significantly higher scores on the BDI-II depression scale than those without attempts. The findings also showed that patients with lifetime suicide attempts had higher scores on the CT dimension of sexual abuse compared to those without suicide attempts, even after controlling for depression severity; the effect sizes for sexual abuse were small after controlling for depression (partial $\eta^2 = 0.05$, partial $\eta^2 > 0.01$). Also, no significant differences were observed between patients with and without lifetime suicide attempts for positive or negative symptoms, nor for any of the other CT dimensions; controlling for depression severity did not change these results.

The scores on current suicidal ideation on the BSSI ranged from 0 to 31 (mean = 7.87). According to the BSSI cut-off scores, 42.7% of patients had high suicidal risk (BSSI total score ≥6), whereas 57.3% had lower suicidal risk (BSSI total score ≤5). The results indicated that patients with high suicidal risk had significantly higher scores on all CT dimensions, depression, and positive and negative symptoms than the low-risk patients; however, when controlling for the severity of depression, only the CT dimension of physical neglect remained significant. The effect size for physical neglect was small (partial $\eta^2 = 0.05$, partial $\eta^2 > 0.01$).

Pearson's correlations showed that all CT dimensions, positive and negative symptoms, and depression were significantly associated with current suicidal ideation ($p < 0.01$) (Table 4). When controlling for depression, however, partial correlations showed that only the CT dimensions of emotional abuse ($pr = 0.22$) and physical neglect ($pr = 0.25$) were still significantly correlated with current suicidal ideation.

Stepwise logistic regression analysis of lifetime suicide attempts (0 vs. 1 or more attempts) included gender, age, illness duration, age at onset, depression, positive and negative symptoms, and CT dimensions as predictors. Sexual abuse was the only significant predictor of lifetime suicide attempts ($B = 0.22$; Wald test = 4.81; $OR = 1.54$, 95% $CI = [1.07, 1.98]$, $p < 0.05$). It explained 18% of the variance in the regression model and correctly classified 65.9% of the cases compared

Table 2
Comparison of clinical factors between schizophrenia patients with high and low CT (n = 82).

Factors		PANSS negative symptoms			PANSS positive symptoms			Suicidal ideation on the BSSI			Depression on the BDI-II		
	With high/low CT	Mean ± SD	*df*	*t*	Mean ± SD	*df*	*t*	Mean ± SD	*df*	*t*	Mean ± SD	*df*	*t*
Total childhood trauma on the CTQ-SF	High (n = 32, 39%)	24.53 ± 7.92	80	3.16 **	19.00 ± 4.77	80	3.47***	12.84 ± 9.91	45.48	4.20***	25.72 ± 12.70	56.01	4.97***
	Low (n = 50, 41%)	19.38 ± 6.71			15.32 ± 4.62			4.68 ± 5.96			12.44 ± 10.24		
CTQ-SF emotional abuse	High (n = 37, 45.1%)	25.59 ± 6.81	80	5.24***	18.89 ± 4.11	80	3.87***	13.00 ± 9.24	54.80	5.46 ***	25.46 ± 12.51	65.14	5.76***
	Low (n = 45, 54.9%)	17.93 ± 6.40			15.00 ± 5.01			3.64 ± 5.30			11.18 ± 9.30		
CTQ-SF physical abuse	High (n = 33, 40.2%)	25.09 ± 7.17	80	3.94***	19.09 ± 4.45	80	3.75***	11.85 ± 9.16	57.90	3.51***	24.33 ± 12.21	80	4.24***
	Low (n = 49, 59.8%)	18.90 ± 6.87			15.18 ± 4.75			5.18 ± 7.26			13.10 ± 11.47		
CTQ-SF sexual abuse	High (n = 27, 32.9%)	24.00 ± 8.21	80	2.24*	18.44 ± 4.47	80	2.20*	13.04 ± 9.59	39.94	3.72***	26.93 ± 11.80	80	5.26***
	Low (n = 55, 67.1%)	20.11 ± 6.99			15.93 ± 5.06			5.33 ± 6.97			13.05 ± 10.95		
CTQ-SF emotional neglect	High (n = 32, 39%)	22.97 ± 8.52	80	1.52	18.66 ± 4.65	80	2.88**	11.97 ± 9.35	53.69	3.48***	24.13 ± 13.13	80	3.95***
	Low (n = 50, 61%)	20.38 ± 6.83			15.54 ± 4.86			5.24 ± 7.13			13.46 ± 11.08		
CTQ-SF physical neglect	High (n = 43, 52.4%)	23.67 ± 7.83	80	3.0**	17.84 ± 5.22	80	2.10*	11.02 ± 9.42	73.26	3.80***	22.86 ± 13.03	78.41	4.28***
	Low (n = 39, 47.6%)	18.87 ± 6.53			15.56 ± 4.49			4.38 ± 6.20			11.85 ± 10.22		

Note. BSSI: Beck Scale of Suicide Ideation; BDI-II: Beck Depression Inventory-II; PANSS; Positive and Negative Syndrome Scale; CT: childhood trauma.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

Table 3
Comparison between the schizophrenia patients with and without lifetime suicide attempts, and with low and high suicide risk, according to the dimensions of childhood trauma, psychotic symptoms, and depression.

Factors		Patients with and without lifetime suicide attempts, Mean ± SD		Statistics			Patients with High (BSSI score ≥6) and Low (BSSI score ≤5) suicidal risk, Mean ± SD		Statistics		
	Total (n = 82)	≥1 Attempt (n = 34)	0 Attempts (n = 48)	F^a	$Adj.F^b$	Partial η^2	High Risk (n = 35)	Low Risk (n = 47)	F^a	$Adj.F^b$	Partial η^2
Childhood trauma dimensions on the CTQ-SF											
Emotional abuse	10.13 ± 5.33	11.41 ± 5.80	9.23 ± 4.83	3.43	2.31	0.03	13.11 ± 5.40	7.91 ± 4.09	24.66**	1.22	0.02
Physical abuse	8.27 ± 4.20	9.00 ± 4.74	7.75 ± 3.73	1.78	0.76	0.01	10.43 ± 4.90	6.66 ± 2.66	19.98**	2.32	0.03
Sexual abuse	7.30 ± 3.25	8.26 ± 3.78	6.63 ± 2.64	5.35*	3.92*	0.05	8.80 ± 3.98	6.19 ± 1.96	15.23**	0.13	0.002
Emotional neglect	11.13 ± 5.23	11.56 ± 4.95	10.83 ± 5.45	0.38	0.19	0.002	13.46 ± 4.92	9.40 ± 4.80	13.99**	3.64	0.03
Physical neglect	9.37 ± 4.24	9.76 ± 4.37	9.08 ± 4.18	0.51	0.09	0.001	11.83 ± 4.48	7.53 ± 2.97	27.22**	4.09*	0.05
PANSS positive symptoms	16.76 ± 4.99	17.41 ± 5.41	16.29 ± 4.67	1.01	0.10	0.001	19.03 ± 4.08	15.06 ± 4.97	14.82**	3.24	0.04
PANSS negative symptoms	21.39 ± 7.56	22.38 ± 7.57	20.69 ± 7.60	0.99	0.16	0.002	24.91 ± 6.98	18.77 ± 6.99	15.53**	3.77	0.04
Depression on the BDI-II	17.62 ± 12.95	23.09 ± 13.87	13.75 ± 10.81	11.72**	–	0.13	27.03 ± 12.48	10.62 ± 7.91	52.87**	–	0.40

Note. Data are expressed as mean ± standard deviation or otherwise specified. ANOVA, ANCOVA, and effect size (partial η^2) were employed for dimensional variables.
Effect size was performed by controlling for depression.
BSSI: Beck Scale of Suicide Ideation; CTQ-SF: Childhood Trauma Questionnaire-Short Form; BDI-II: Beck Depression Inventory-II; PANSS; Positive and Negative Syndrome Scale.
[a] Analysis of variance (ANOVA).
[b] Adjusted F: Analysis of covariance (ANCOVA) controlling for depression severity.
* $p < 0.05$.
** $p < 0.001$.

to the 41.5% that would be guessed by chance. In a similar stepwise logistic regression analysis of current suicidal ideation (absent vs. present), physical neglect (B = 0.26; Wald test = 11.81; OR = 2.26, 95% CI = [1.70, 2.80], $p < 0.001$) and depression (B = *0.18;* Wald test = 6.54; OR = 1.44, 95% CI = [1.10, 1.75], $p < 0.01$) were unique predictors of current suicidal ideation and correctly classified 77.7% of the cases compared to the 42.7% that would be correctly guessed by chance. In the regression model, physical neglect and depression explained 35% and 12% of the variance in current suicidal ideation, respectively.

4. Discussion

The results of the current study are summarized as follows: 1- Compared to patients with low levels of CT, patients with high CT had significantly more severe suicidal ideation and symptoms of all kinds; 2- History of past suicide attempts and current suicidal ideation were only moderately correlated with each other, and even more weakly correlated when controlling for depression; 3- Suicidal ideation was associated with all types of CT and symptoms without controlling for depression, whereas it was only associated with two types of CT (emotional abuse and physical neglect) when controlling for depression; 4- One type of abuse (sexual) was a unique predictor of lifetime suicide attempts, and one type of neglect (physical), and one type of symptoms (depression) were unique predictors of current suicidal ideation, suggesting that the association with depression was much weaker for attempts than ideation; 5- psychotic symptoms did not significantly predict a history of attempts and suicidal ideation after controlling for the current levels of depression.

In the present study, patients with high CT had higher current suicidal ideation, depression, and psychotic symptoms than those with low CT. According to these findings, hypothesis 1 was supported. Previous studies have shown that a history of CT may lead to increased risk for positive and negative symptoms of psychosis, depression, dissociation, and suicidality (Holowka et al., 2003; Braehler et al., 2013; Mandelli et al., 2015; Isvoranu et al., 2017; Hassan et al., 2016; Bani-Fatemi et al., 2016). The relationship between CT and psychosis is pronounced (van Os and Linscott, 2012) even when genetic vulnerability to psychosis is taken into account (Arseneault et al., 2011). CT may lead to a biological or psychological vulnerability to psychotic symptoms (Read et al., 2001; Garety and Rigg, 2001; Janssen et al., 2004; Braehler et al., 2005).

In this study, logistic regression analyses indicated that among CT dimensions, only sexual abuse was a unique predictor of suicide attempts, and only physical neglect was a unique predictor of current suicidal ideation. Also, among clinical symptoms, only depression significantly and uniquely predicted suicidal ideation. The results of the ANCOVAs also confirmed these findings. Thus, hypotheses 2 and 3 are at best only partially supported. These results were in line with previous studies (Ucok and Bikmaz, 2007; Conus et al., 2010; Bani-Fatemi et al., 2016; Hassan et al., 2016), suggesting that sexual abuse is particularly associated with lifetime suicide attempts. In a meta-analysis, Ng et al. (2018) concluded that sexual abuse is a risk factor for lifetime suicide attempts. Furthermore, our finding that patients with lifetime suicide attempts had higher sexual abuse than those without prior attempts after controlling for depression severity suggests that the risk of suicide attempts is not entirely due to increased depression, because the F score in predicting suicide attempts went from 5.35 without controlling for depression to 3.92 after controlling for depression (Table 3), meaning that some of the increased risk of suicide attempts related to sexual abuse is through depression.

A history of sexual abuse in patients with psychosis may lead to adverse outcomes such as impaired social functioning (Alameda et al., 2015), increased emotional distress (Leonhardt et al., 2015), and resistance to antipsychotic treatment (Hassan and De Luca, 2015). According to these adverse outcomes, it is reasonable to say that sexual

Table 4
Pearson's correlations, and partial correlations controlling for depression, between suicide ideation and the dimensions of childhood trauma, positive and negative symptoms, and depression in patients with schizophrenia (n = 82).

Factors		Suicide ideation on the BSSI[a]	BSSI controlling for depression (BDI-II)[b]
Childhood trauma on the CTQ-SF	Emotional abuse	0.60**	0.22*
	Physical abuse	0.49**	0.17
	Sexual abuse	0.51**	0.14
	Emotional neglect	0.37**	0.16
	Physical neglect	0.56**	0.25*
Psychotic symptoms on the PANSS	Positive symptoms	0.43**	0.20
	Negative symptoms	0.51**	0.18
Depression on the BDI-II	0.74**	–	

CTQ-SF: Childhood Trauma Questionnaire-Short Form; PANSS; Positive and Negative Syndrome Scale; BDI-II: Beck Depression Inventory-II; BSSI: Beck Scale of Suicide Ideation.
[a] Pearson's correlations.
[b] Partial correlations by controlling for depression severity.
* $p < 0.05$.
** $p < 0.01$.

abuse is important in predicting lifetime suicide attempts in schizophrenia. It has been found that patients with a history of sexual abuse are 10 times more likely to have a high degree of suicidal risk than those without sexual abuse (Soloff et al., 2002).

A history of physical neglect was a unique predictor of current suicidal ideation in the present study. Similar to this finding, two studies have reported that childhood neglect is associated with suicidal ideation or behaviors in schizophrenia (Xie et al., 2018; Prokopez et al., 2018). Physical neglect has been found to be highly prevalent in schizophrenia (Xie et al., 2018), and Mandelli et al. (2015) have found that childhood neglect is a strong risk factor for the development of depressive symptoms. In addition, it has been thought that individuals who have a history of CT are at higher risk for depression or suicidal behaviors than those without CT (Moretti and Craig, 2013). Roy (2005) has shown that CT may lead to suicidal behaviors through increasing risk factors including depressive symptoms. It has been found that a history of CT can result in structural and/or functional changes in brain and subsequently various cognitive, behavioral, and psychological health outcomes later in life (Blanco et al., 2015). Gil et al. (2009) reported that physical neglect is correlated with functional and social impairments in patients with schizophrenia. Vogel et al. (2009) reported that physical neglect is associated with dissociation in schizophrenia, which Braehler et al. (2013) also found in both chronic patients with schizophrenia and community control subjects. Research has shown that dysfunctional complications of CT may be due to interactions with specific genetic predisposing factors and then worse coping strategies related to negative consequences such as suicidal behaviors (Boyda and McFeeters 2015; Kim and Lee, 2016).

In the current study, logistic regression analyses showed that, in addition to physical neglect, depression was a unique predictor of current suicidal ideation, but not of lifetime suicide attempts. It has been found that childhood neglect is closely related to depression (Sitko et al., 2014) and suicidal behaviors (Xie et al., 2018). In patients with schizophrenia, it is possible that physical neglect and depression together increase suicidal ideation that occurs frequently in individuals with lifetime suicide attempts (Joiner and Rudd, 2000). As such, both physical neglect and depression may enhance current suicidal ideation among patients with schizophrenia who had lifetime suicide attempts.

In this study, we found that positive and negative symptoms were significantly higher in patients with current suicidal ideation; however, when correlations controlled for the severity of depression, or when these symptoms were included in logistic regression analyses that controlled for other predictors that included depression, the effects of positive and negative symptoms were no longer significant. These results were in line with at least one previous study (e.g., Hawton et al., 2005). Other studies that showed significant associations between positive and negative symptoms and lifetime suicide attempts and/or current suicidal ideation (e.g., Saarinen et al., 1999; Tarrier et al., 2004, 2006; McGirr et al., 2006; Taylor et al., 2010; Umut et al., 2013; Yan et al., 2013; Luckhoff et al., 2014; Bornheimer, 2016) failed to control for depression. Although logistic regression analyses showed that these symptoms were not unique predictors of suicidal risk in the present study, the studies that are inconsistent with ours were not necessarily examining whether psychotic symptoms along with CT and depression were unique predictors of suicidal risk. Positive and negative symptoms may be predictive factors of suicidal risk when childhood abuse/neglect and depression are not controlled (Table 3). Also, it must be noted, however, that the range of severity of psychotic symptoms was somewhat restricted in the present study (e.g., excluding patients with active psychosis), and may have weakened the associations between psychotic symptoms and suicidality.

This study had several limitations. First, personality disorders (e.g., borderline personality disorder) which are known as vulnerability factors for suicidal risk were not measured in this study. Further studies are needed to compare CT between schizophrenia patients with and without personality disorders. Second, this study was a cross-sectional design which does not allow for an examination of causation. Third, conclusions drawn from a hospitalized sample may not apply to all patients with schizophrenia. Fourth, lack of a normal or clinical control group was a further limiting factor to clarify whether these results are specific to schizophrenia. Fifth, a sample including 82 patients with schizophrenia can be considered of limited statistical power. Finally, the use of self-report instruments (CTQ-SF, BSSI, BDI-II) may involve response bias.

Regardless of the above-mentioned limitations, the results of the present study showed that sexual abuse, physical neglect, and depression were unique predictors of suicidal risk. These findings suggested that patients with schizophrenia who had increased depression and childhood histories of sexual abuse and physical neglect may be at increased risk for suicidality. The present study may have important clinical implications. Although all patients with schizophrenia were under treatment with antipsychotic medications, the rate of suicidal risk was still high. Therefore, unpleasant childhood experiences may play an important role in suicide among patients with schizophrenia. Our findings showed that sexual abuse and physical neglect were unique predictors of suicidality. Thus, a careful assessment of CT in patients with schizophrenia may successfully screen for those who are at increased risk for suicidality. In addition to the administration of antipsychotic drugs, therapists should also pay attention to the role of CT, especially sexual abuse and physical neglect, to prevent suicide in patients with schizophrenia. Moreover, these individuals could benefit from education and more intense treatments to prevent negative outcomes such as depression.

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