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Early Maladaptive Schemas Are Associated with Increased Suicidal Risk among Individuals with Schizophrenia

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Abstract

Early maladaptive schemas (EMSs) are a dysfunctional cognitive pattern that can result from maladaptive functioning during childhood. EMSs are broad patterns of memories, emotions, cognitions, and bodily sensations related to the self and others. The aims of this study were to evaluate EMSs among individuals with schizophrenia and to evaluate the relations of EMSs and clinical factors (e.g., depression, positive, and negative symptoms of psychosis) to suicidal risk (e.g., current suicidal ideation, lifetime suicide attempts). Eighty-two inpatients with schizophrenia completed the Young Schema Questionnaire-Short Form (YSQ-SF), the Beck Depression Inventory-II (BDI-II), the Beck Scale for Suicide Ideation (BSSI), and the Positive and Negative Syndrome Scale (PANSS). Individuals with schizophrenia who had attempted suicide (relative to those who had not attempted suicide) had significantly higher EMSs, current suicidal ideation, and a family history of suicide attempts. Logistic regression analysis revealed that the emotional deprivation schema, positive symptoms, and depression were significantly associated with current suicidal ideation. In addition, emotional deprivation was significantly associated with lifetime suicide attempts. These findings suggest that the emotional deprivation schema, positive symptoms, and depression may be related to suicide in individuals with schizophrenia.

Keywords Early maladaptive schemas · Suicidal risk · Schizophrenia

Introduction

Suicide is one of the primary contributors to mortality in individuals with schizophrenia (Laursen et al. 2014), and between 40 and 50% of individuals with schizophrenia report

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suicidal ideation and lifetime suicide attempts (Montross et al. 2005; Pompili et al. 2007). Numerous clinical and socio-demographic factors are associated with suicidality in individuals with schizophrenia, such as depression (Bornheimer 2016; Kilicaslan et al. 2017; Palmier-Claus et al. 2013; Togay et al. 2015), substance/alcohol use (Togay et al. 2015), hopelessness (Pompili et al. 2009), being single (Zoghbi et al. 2014), having previous suicide attempts (Gallego et al. 2015), obsessive-compulsive symptoms (OCD) (Szmulewicz et al. 2015), frequent hospitalizations, negative attitudes toward treatment (De Hert et al. 2001), poor adherence to treatment (Hawton et al. 2005), young age, male gender (Popovic et al. 2014), and physical comorbidity (Cassidy et al. 2017).

Schizophrenia consists of multiple symptoms, including positive and negative symptoms, which may differ in their associations with suicidality. Positive symptoms refer to aberrations in thinking and perception, including delusions, hallucinations, and impaired thought and speech (American Psychiatric Association 2000; Kneisl and Trigoboff 2004). Negative symptoms are reductions in natural emotional, motivational, and behavioral processes, including emotional uniformity or lack of affection, poverty of speech, anhedonia, unwillingness to form relationships, and lack of motivation (American Psychiatric Association 2000).

There are some contradictory results regarding the association between positive symptoms and suicide. A large numbers of studies have found significant positive associations between positive symptoms and suicidal ideation in individuals with schizophrenia (Bornheimer 2016; Saarinen et al. 1999; Tarrier et al. 2006; Taylor et al. 2010), but one study reported that reduced suicidal risk is related to positive symptoms (this study also found that suicidal risk is more relevant to affective symptoms than to psychotic symptoms; Hawton et al. 2005). Results are also mixed regarding the association between negative symptoms and suicide. Some studies have suggested that negative symptoms are a protective factor against suicide (Schwartz-Stav et al. 2006; Tarrier et al. 2007), while other studies reported positive associations between negative symptoms and suicidal ideation (Luckhoff et al. 2014; McGirr et al. 2006; Tarrier et al. 2004; Umut et al. 2013; Yan et al. 2013). It is also important to note that there is some overlap between depression—a strong risk factor for suicide—and negative symptoms (Barnes and McPhillips 1995; Siris 2000), which should be accounted for in statistical analyses. It is possible that suicide is related to schizophrenia primarily due to comorbid depression.

In addition to associations between the classical symptoms of schizophrenia and suicide, it may be informative to examine cognitive structures including early maladaptive schemas (EMSs) that may play a role in suicidality. Most prior studies only examined the relationship between positive and negative symptoms and suicidality, and did not consider multiple-related predictors at once (e.g., EMSs, positive and negative symptoms, and depression) may lead to misleading or incomplete conclusions. To address this issue, the aim of the present study was to determine the extent to which numerous clinical and psychological factors (EMSs, depression, negative and positive symptoms) distinguish individuals with schizophrenia with and without (1) a lifetime history of suicide attempts, and (2) current suicidal ideation.

Young (1998) suggested 15 EMSs, such as abandonment, mistrust/abuse, emotional deprivation, and self-sacrifice (Please see Table 1 for more details.) According to Young's cognitive schema theory (Young 1990), EMSs are cognitive dysfunctional

patterns or beliefs of memories, emotions, cognitions, and bodily sensations about the self and others which contribute to the development and maintenance of a range of psychopathology. EMSs may develop following unpleasant experiences during childhood and adolescence, e.g., parent violence, insecure attachment, parent divorce, absent parents, and childhood trauma (Young 1990; Young et al. 2003). Based on schema theory, individuals who have high levels of EMSs may think "I cannot belong to someone and I am an unsociable person," which is consistent with negative symptoms such as an unwillingness to form relationships. Individuals may also have maladaptive inaccurate beliefs such as "I suspect others' motives" or "Others betray me sooner or later," which could be related to positive symptoms such as paranoid delusions. Similar to schema theory, cognitive theories of schizophrenia propose that individuals with this disorder often have dysfunctional or irrational beliefs (e.g., "I'm inferior"). Specifically, these beliefs lead to dysfunctional cognitive appraisals and then to maladaptive behaviors (e.g., social withdrawal) (Beck and Rector 2005; Kingdon and Turkington 1994), which may contribute to the development or maintenance of psychosis (Garety et al. 2007). Cognitive models propose that experiencing social adversities (e.g., adverse childhood experiences, intrusive life events) leads to dysfunctional cognitive schemas or incorrect judgment in an individual (e.g., considering the world a threatening and unsafe place; viewing external factors or other people as the cause of negative events and experiences; considering many events and experiences as uncontrollable) (Bentall et al. 2009; Garety et al. 2001), and in some cases, these inaccurate beliefs may result in symptoms such as delusions or social withdrawal.

Numerous studies have shown that EMSs correlate with psychiatric conditions, including depression (Rezaei and Ghazanfari 2016), eating disorders (Unoka et al. 2010), bipolar disorder (BD) (Hawke and Provencher 2012), substance use disorders (Khosravani et al. 2016a, b, c, 2017a), OCD (Khosravani et al. 2017b), suicide among individuals with OCD symptoms (Kim et al. 2014), borderline personality disorder (BPD) (Bach and Farrell 2018), and panic disorder (Kwak and Lee 2015). It has been found that individuals with schizophrenia have higher scores on EMSs relative to the general population (Bortolon et al. 2013; Khosravani et al. 2019a, b; Sundag et al. 2016). They specifically score higher on the mistrust/abuse schema relative to some other individuals with psychiatric disorders (Khosravani et al. 2019b), and this schema was associated with more positive symptoms (Bortolon et al. 2013; Sundag et al. 2016; Khosravani et al. 2019b). In contrast, the social isolation schema was related to negative symptoms in individuals with schizophrenia (Khosravani et al. 2019a). Taylor and Harper (2017) suggested that most EMSs are associated with distress and impaired social functioning in individuals with psychosis. Some EMSs appear to moderate the relation of child maltreatment to psychosis-like experiences (Boyda et al. 2018). Overall, there is reasonable evidence that EMSs are linked to schizophrenia and more specifically, to positive symptoms.

Although the association of EMSs with suicidal risk in individuals with schizophrenia has not yet been studied, studies have found significant relationships between EMSs and suicidality in other clinical and non-clinical samples. For example, Dale et al. (2010) reported that the schemas of social isolation, defectiveness, vulnerability to harm, subjugation, emotional inhibition, entitlement, and insufficient self-control were correlated with chronic suicidal risk in suicide attempters. Similarly, Castille et al. (2007) reported that individuals who engaged in self-mutilation showed higher levels of

Table 1 Description of Young's EMSs

EMSs	Description
Emotional deprivation	Refers to one's belief that his/her emotional needs will not be satisfied by others.
Abandonment	Refers to one's belief that significant or close individuals will leave her/him.
Mistrust/abuse	Refers to one's belief that individuals abuse him/her.
Social isolation	Refers to one's belief that he/she has been isolated from others or the society.
Defectiveness	Refers to one's belief that he/she is deficient than others in many aspects.
Failure	Refers to one's belief that he/she will fail in most aspects of life and other situations.
Dependence	Refers to one's belief that he/she is dependent upon others in doing things.
Vulnerability to harm	Refers to one's belief that bad events will happen to him/her and he/she will not be able to deal with it.
Enmeshment	Refers to one's belief that he/she has high emotional involvement with others and continues to remain dependent upon others.
Subjugation	Refers to one's belief that he/she must give his/her control to other individuals in order to make them satisfied and prevent them from leaving him/her.
Self-sacrifice	Refers to one's belief that he/she should satisfy the needs of other individuals even at the cost of losing his/her personal satisfaction.
Emotional inhibition	Refers to one's belief that he/she should suppress expressions of emotion to be approved and not to be criticized by other individuals.
Unrelenting standards	Refers to one's belief that he/she must try hard to obtain ambitious criteria to be approved by others.
Entitlement	Refers to one's belief that he/she is superior and better than others and does not consider him/herself to observe mutual respect with others.

Adapted from Young et al. (2003)

EMSs, early maladaptive schemas

emotional deprivation, mistrust/abuse, social isolation, and insufficient self-control, compared with individuals who did not self-mutilate. With regard to specific disorders, individuals with bipolar disorder who have lifetime suicide attempts (Nilsson 2016) and increased suicidal risk (Khosravani et al. 2019c) scored higher on social isolation, defectiveness, and entitlement, compared with those at lower suicide risk. EMS total score was also related to suicidal ideation in individuals with borderline personality features (Sajadi et al. 2015). Last, Dutra et al. (2008) found that social isolation, defectiveness, and failure were related to suicidal risk in traumatized samples. Taken together, there is reason to suspect that EMSs may be linked to suicidality in a broad range of clinical populations, and identifying specific EMSs related to suicidal risk may increase literature regarding suicide among individuals with schizophrenia.

The aims of the current study were (a) to compare individuals with schizophrenia with and without lifetime suicide attempts on demographic (e.g., gender, age, education, and marital status) and clinical factors (e.g., age of onset of schizophrenia, illness duration, positive and negative symptoms, and depression); and (b) to examine the association of suicidal risk (current suicidal ideation and lifetime suicide attempts) with EMSs, positive and negative symptoms, and depression. Because mistrust/abuse and social isolation schemas were related to psychotic symptoms in past studies, we hypothesized that these specific EMSs—along with depression and positive and

negative symptoms—would relate to current suicidal ideation and lifetime suicide attempts.

Methods

Participants

The study was conducted at the Rahnema Psychiatric Inpatient Center in Tehran, Iran. A total of 180 inpatients with a principal diagnosis of schizophrenia were randomly selected for the study, and 82 participants (age range = 18–60 years) were eligible and chose to participate in the study based on exclusion criteria. Exclusion criteria were the presence of neurological and medical diseases, brain injury, substance/alcohol abuse, psychosis not otherwise specified (NOS), or psychosis due to general medical conditions, and active psychosis at the time of assessment. Diagnostic criteria were assessed with the Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Patient version (SCID-I/P; First et al. 2002).

Procedure

Interviews with participants were performed 2 weeks after hospitalization. The Positive and Negative Syndrome Scale (PANSS) was administered, and psychiatric diagnoses were determined by an experienced psychiatrist. All participants completed the following self-report scales: the Young Schema Questionnaire-Short Form (YSQ-SF), the Beck Depression Inventory-II (BDI-II), and the Beck Scale for Suicide Ideation (BSSI). All participants were taking antipsychotic medications. Participant information such as age of onset, illness duration, and a family history of suicide attempts and psychiatric disorders were obtained from their psychiatric records. All participants agreed to participate in the study and signed written informed consents. Participants were studied in accordance with the 1989 revision of the Helsinki Declaration.

Measures

The YSQ-SF (Young 1998; Young et al. 2003) This scale YSQ-SF is a 75-item tool which examines 15 EMSs. Each item is rated on a six-point Likert scale from 1 (completely false) to 6 (completely true). We used the Persian version of the YSQ-SF, which has demonstrated acceptable internal consistency (Cronbach's alpha = 0.76; Khosravani et al. in press). Cronbach's alpha for the scale in the current study was 0.98.

The PANSS (Kay et al. 1987) The scale is a 30-item semi-structured interview conducted by trained researchers that is widely used to measure positive and negative symptoms of psychosis. In the present study, the Persian version of the PANSS (Ghamari Givi et al. 2010) was used. Ghamari Givi et al. (2010) reported that the Persian version of the scale has adequate construct validity. Cronbach's alpha for the scale was 0.95 in the present research.

The BDI-II (Beck et al. 1996) The BDI-II is a 21-item self-report inventory which measures depression severity during the past week. Total scores range from 0 to 63. The BDI-II is a reliable and valid measure of depressive symptoms (Beck et al. 1998). We used the Persian version of the scale (Ghassemzadeh et al. 2005), which has demonstrated good internal consistency (Cronbach's alpha = 0.85; Khosravani et al. 2017c). Cronbach's alpha for the scale was 0.83 in this study.

The BSSI (Beck et al. 1979) The BSSI is a 19-item scale that evaluates suicidal ideation during the past week. Each item is rated on a three-point Likert scale ranging from 0 (indicating the absence of depressive symptoms) to 2 (indicating the presence of severe depressive symptoms). We used the Persian version of the scale (Esfahani et al. 2015) with Cronbach's alpha equal to 0.95 (Ghorbani et al. 2017). Cronbach's alpha for the scale in the current research was 0.94.

Statistical Analyses

Socio-demographic characteristics and clinical factors were compared for individuals with and without lifetime suicide attempts using the chi-squared test and *t* test. Pearson's correlation (*r*) and partial correlation (*pr*) were used to evaluate the relations of EMSs, positive and negative symptoms, and depression with current suicidal ideation.

According to BSSI cutoff scores, total BSSI scores ≥ 6 are consistent with the presence of high suicidal risk or current suicidal ideation, whereas scores ≤ 5 suggest low suicidal risk or current suicidal ideation (Sokero et al. 2003). Therefore, we computed the presence and absence of current suicidal ideation as a binary variable, using the above cutoffs. Similarly, lifetime history of suicide attempts was analyzed as a binary variable (history of one or more attempts vs. no attempts). The presence or absence of a history of lifetime suicide attempts was detected through psychiatric records of the participants and a clinical evaluation by an experienced clinical psychologist using the SCID-I/P. We used binary logistic regression (appropriate for categorical outcome variables like those used here) with the forward conditional method to assess the associations of EMSs and clinical factors with the presence or absence of a history of lifetime suicide attempts and current suicidal ideation. The forward method was selected because it allows for (1) the inclusion of all independent variables in the regression equation, and (2) the identification of the strongest predictors in relation to criterion variables. Age, gender, education, marital status, age of onset of schizophrenia, and illness duration were entered in step 1 as covariates. Clinical variables—positive and negative symptoms and depression— were entered in step 2, and finally all EMSs were entered in step 3. To test the nature of the associations among EMSs, psychotic symptoms, and depression related to suicidality in regression logistic, we also performed a mediation analysis (with depression and positive and negative symptoms as the mediators) using Hayes' macro PROCESS (Hayes 2013) with 5000 bootstrapped samples.

Reliability of the scales was indexed using Cronbach's alpha. Data were analyzed with SPSS-22.0 software (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.

Results

Demographic and clinical variables are shown in Table 2. Among participants, 41.5% had lifetime suicide attempts, with 13.4% who had made a single attempt and 28.1% with 2 or more attempts. According to the BSSI cutoff scores, 42.7% of individuals with schizophrenia were at high current suicidal risk (BSSI ≥ 6) while 57.3% were not (BSSI ≤ 5). Beyond suicidal risk, 31.7% of the sample had scores between 0 and 9 on the BDI-II, indicating minimal depression; 29.3% had scores between 10 and 18, showing mild depression; 19.5% had scores between 19 and 29, indicating moderate depression; and 19.5% had scores between 30 and 63, indicating severe depression.

Table 2 Demographic and clinical characteristics of individuals with schizophrenia with and without lifetime suicide attempts

Characteristics	Lifetime suicidal attempts, *n* (%) or mean ± SD			Statistics	
	Total (*n* = 82)	Yes (*n* = 34)	No (*n* = 48)	*t* or χ^2	*p*
Gender				$\chi 2 = 0.75$	0.39
Male	34 (41.5%)	16 (19.5%)	18 (22%)		
Female	48 (58.5%)	18 (21.9%)	30 (36.6%)		
Age, years	34.78 ± 9.10	33.15 ± 9.84	35.94 ± 8.45	$\chi 2 = 38.05$	0.25
Education level, years	9.85 ± 3.61	9.03 ± 2.91	10.44 ± 3.96	$\chi 2 = 19.24$	0.16
Marital status				$\chi 2 = 1.44$	0.39
Single	31 (37.8%)	11 (13.4%)	20 (24.4%)		
Married	32 (39%)	13 (15.8%)	19 (23.1%)		
Divorced	19 (23.2%)	10 (12.2%)	9 (11%)		
Age at onset, years	25.71 ± 7.92	24.00 ± 7.92	26.92 ± 7.78	$\chi 2 = 28.78$	0.32
Illness duration, years	9.01 ± 6.06	9.09 ± 4.52	8.96 ± 6.99	$\chi 2 = 19.84$	0.47
A family history of suicide				$\chi 2 = 12.97$	0.001**
Yes	16 (19.5%)	13 (15.8%)	3 (3.7%)		
No	66 (80.5%)	21 (25.6%)	45 (54.9%)		
A family history of psychiatric disorders				$\chi 2 = 20.03$	0.16
Yes	43 (52.4%)	22 (26.8%)	21 (25.6%)		
No	39(47.6%)	13 (15.9%)	26 (31.7%)		
Depression	17.62 ± 12.95	14.21 ± 4.49	12.96 ± 4.52	$t = 1.23$	0.22
Positive symptoms	16.76 ± 4.99	17.41 ± 5.41	16.29 ± 4.67	$t = 1.001$	0.32
Negative symptoms	21.39 ± 7.56	22.38 ± 7.57	20.69 ± 7.60	$t = 1.00$	0.32
EMSs total scores	224.29 ± 80.35	248.15 ± 64.44	207.40 ± 86.64	$t = 2.32$	0.05*
Current suicidal ideation	7.87 ± 8.67	12.24 ± 9.43	4.77 ± 6.59	$t = 4.22$	0.001**

EMSs, early maladaptive schemas

*$p < 0.05$

**$p < 0.001$

There were no significant differences between individuals with and without lifetime suicide attempts with regard to gender, age, education, marital status, age at onset, illness duration, family history of psychiatric disorders, depression, and positive and negative symptoms. Individuals with lifetime suicide attempts scored higher on EMSs ($p < 0.05$), current suicidal ideation, and a family history of suicide attempts ($p < 0.001$) than those without such attempts (Table 2).

Pearson's correlations showed that positive and negative symptoms, depression, and all EMSs except for self-sacrifice and unrelenting standards were positively associated with current suicidal ideation ($p < 0.001$) (Table 3). Emotional deprivation ($pr = 0.32$, $p < 0.01$), abandonment ($pr = 0.25$, $p < 0.05$), mistrust/abuse ($pr = 0.25$, $p < 0.05$), social isolation ($pr = 0.27$, $p < 0.05$), defectiveness ($pr = 0.27$, $p < 0.05$), and positive symptoms ($pr = 0.29$, $p < 0.05$) remained significantly associated with current suicidal ideation, after controlling for depressive symptoms (Table 3). In addition, partial correlations that controlled for positive and negative symptoms separately indicated that positive symptoms, depression, and all EMSs except for failure, self-sacrifice, and unrelenting standards remained significantly correlated with current suicidal ideation (Table 3).

Logistic regression analysis predicting the presence vs absence of lifetime suicide attempt(s) showed that emotional deprivation was significantly associated with increased odds of lifetimes suicide attempts (odd ratio (OR) = 1.56, 95% CI = [1.12, 1.98], $p < 0.001$). It explained 20% of the variance in the regression model and correctly classified 60.5% of the cases (Table 4). When predicting the presence vs. absence of current suicidal ideation, emotional deprivation ($OR = 2.31$, 95% CI = [1.89, 2.71], $p < 0.001$), positive symptoms ($OR = 1.18$, 95% CI = [1.02, 1.37], $p < 0.01$), and depression ($OR = 1.14$, 95% CI = [0.98, 1.32], $p < 0.05$) were significantly related with current suicidal ideation. These variables explained 30%, 12%, and 10% of current suicidal ideation, respectively, and the model correctly classified 75.6% of the cases with current suicidal ideation (Table 4). Hypothesized EMSs (i.e., mistrust/abuse and social isolation) were not related to suicidal risk, but current suicidal ideation and lifetime suicide attempts were associated with the emotional deprivation schema, after accounting for relevant demographic and clinical covariates. Moreover, current suicidal ideation was also associated with positive symptoms and depression.

Examination of direct and indirect relations of emotional deprivation on current suicidal risk through positive and negative symptoms and depression showed that the overall model explained 68% of the variability in current suicidal ideation (F (4, 77) = 26.01 $p < 0.0001$). Emotional deprivation was significantly associated with positive symptoms ($B = 0.21$, $SE = 0.07$, $p < 0.01$), negative symptoms ($B = 0.35$, $SE = 0.10$, $p < 0.001$), and depression ($B = 1.12$, $SE = 0.07$, $p < 0.0001$). Positive, but not negative, symptoms ($B = 0.18$, $SE = 0.15$, $p < 0.05$) and depression ($B = 0.40$, $SE = 0.08$, $p < 0.0001$) were significantly related to current suicidal ideation. In addition, emotional deprivation was indirectly associated with current suicidal ideation through positive symptoms ($B = 0.16$, $SE = 0.04$, 95% CI = 0.01–0.11) and depression ($B = 0.44$, $SE = 0.11$, 95% CI = 0.25–0.56).

Discussion

This study aimed to investigate the associations of EMSs and clinical factors with suicidal risk among individuals with schizophrenia. Although most prior studies on

Table 3 The relations of EMSs and positive and negative symptoms to current suicidal ideation in individuals with schizophrenia ($n = 82$)

		Mean ± SD	Current suicidal ideation [a]	Current suicidal ideation [b]	Current suicidal ideation [c]	Current suicidal ideation [d]
EMSs	Emotional deprivation	15.94 ± 7.76	0.58***	0.32**	0.47***	0.46***
	Abandonment	16.00 ± 7.38	0.55***	0.25*	0.31**	0.32**
	Mistrust/abuse	15.57 ± 7.01	0.54***	0.25*	0.43***	0.43***
	Social isolation	13.39 ± 7.85	0.54***	0.27*	0.50***	0.41***
	Defectiveness	12.51 ± 7.46	0.50***	0.27*	0.49***	0.41***
	Failure	14.16 ± 7.48	0.40***	0.16	0.21	0.19
	Dependence	12.35 ± 6.92	0.45***	0.21	0.39***	0.35***
	Vulnerability to harm	12.65 ± 6.85	0.49***	0.24	0.44***	0.37***
	Enmeshment	14.23 ± 7.53	0.45***	0.18	0.35***	0.38***
	Subjugation	13.07 ± 7.74	0.42***	0.20	0.37***	0.32**
	Self-sacrifice	18.01 ± 6.14	0.03	0.05	0.15	0.04
	Emotional inhibition	14.20 ± 6.83	0.41***	0.16	0.39***	0.29**
	Unrelenting standards	20.09 ± 6.20	0.06	0.10	0.02	0.01
	Entitlement	16.77 ± 6.57	0.47***	0.17	0.36***	0.37***
	Insufficient self-control	15.35 ± 6.44	0.37***	0.21	0.25*	0.26*
Psychotic symptoms	Positive symptoms	16.76 ± 4.99	0.52***	0.29*	–	0.33**
	Negative symptoms	21.39 ± 7.56	0.43***	0.21	0.20	–
Depression		17.62 ± 12.95	0.73***	–	0.66***	0.65***

EMSs, early maladaptive schemas

[a] Pearson's correlations

[b] Partial correlations by controlling for depression

[c] Partial correlations by controlling for positive symptoms

[d] Partial correlations by controlling for negative symptoms

*$p < 0.05$

*$p < 0.01$

***$p < 0.001$

the associations between EMSs and psychotic symptoms in individuals with schizophrenia have found significant associations of the mistrust/abuse and social isolation schemas with the positive and negative symptoms of schizophrenia (Bortolon et al. 2013; Sundag et al. 2016; Khosravani et al. 2019a, b), the present study failed to show relationships between the hypothesized EMSs (i.e., mistrust/abuse and social isolation) and suicidality among individuals with schizophrenia. However, our findings indicated that emotional deprivation was associated with lifetime

Table 4 Forward conditional logistic regression analyses to assess the associations of EMSs and clinical factor with lifetime suicide attempts and current suicidal ideation in individuals with schizophrenia ($n = 82$)

	B	Std. error	Wald test	OR	95% CI		*p*
					Lower	Upper	
Predicting lifetime suicide attempts [a]							
Schema of emotional deprivation	0.17	0.02	9.95	1.56	1.12	1.98	0.001***
Predicting current suicidal ideation [b]							
Positive symptoms	0.16	0.08	4.71	1.18	1.02	1.37	0.01**
Depression	0.14	0.09	3.02	1.14	0.98	1.32	0.05*
Schema of emotional deprivation	0.26	0.02	14.25	2.31	1.89	2.71	0.001***

BSSI, Beck Scale of Suicide Ideation; *OR*, odd ratio; *CI*, confidence interval

[a] Statistics of regression analysis regarding lifetime suicide attempts: 34 individuals with lifetime suicide attempts and 48 without them were included in the analysis; Model Summary, 2 Log likelihood = 99.18; Nagelkerke $R^2 = 0.20$; overall percentage of correct classification resulting from the model = 60.5%

[b] Statistics of regression analysis regarding current suicidal ideation: 82 individuals with schizophrenia (35 with suicidal risk (BSSI ≥ 6) and 47 without suicidal risk (BSSI ≤ 5)) were included in the analysis; model summary, 2 Log likelihood = 84.60; Nagelkerke $R^2 = 0.52$; overall percentage of correct classification resulting from the model = 75.6%

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$

suicide attempts and current suicidal ideation. This suggests that some EMSs are related to schizophrenia symptoms, but do not specifically increase risk for suicidality in individuals with schizophrenia.

Several studies have shown that emotional deprivation does not correlate with suicidality in individuals with other mental disorders (Castille et al. 2007; Dale et al. 2010; Dutra et al. 2008; Nilsson 2016; Sajadi et al. 2015). However, some studies with both normal and clinical samples corroborate our results. For example, Ahmadpanah et al. (2017) found that individuals with major depressive disorder with lifetime suicide attempts had higher emotional deprivation than individuals without suicide attempts and normal subjects. Another study also found that parental attachment was indirectly associated with suicide proneness and ideation through emotional deprivation and defectiveness in college students (Langhinrichsen-Rohling et al. 2017). Individuals with emotional deprivation assume that their tendency for emotional ties with others will not be satisfied (Young et al. 2003). Dysfunctional experiences during childhood or adolescence have been found to be associated with psychotic symptoms, irritability, depression, clinical features, poor treatment responses, distress, impaired social functioning, and suicidality in individuals with schizophrenia (Baudin et al. 2016; Bilgi et al. 2017; Carr et al. 2017; Kilicaslan et al. 2017; Li et al. 2015; McGregor et al. 2018; Misiak et al. 2017; Mohammadzadeh et al. 2019; Mørkved et al. 2018; Taylor and Harper 2017) as well as suicidality in individuals with other psychiatric disorders (Khosravani et al. 2017b, e, 2019c). Therefore, these adverse outcomes associated with childhood experiences may be related to suicidality in individuals with schizophrenia. Although our results indicated that emotional deprivation was related to suicidality in

individuals with schizophrenia, longitudinal studies are needed to further clarify these findings.

In addition to emotional deprivation, positive symptoms and depression also were associated with current suicidal ideation in the current study. These results are in line with previous studies reporting the associations between positive symptoms and suicidality (Bornheimer 2016; Saarinen et al. 1999; Tarrier et al. 2006; Taylor et al. 2010), as well as the relations of EMSs to depression (Rezaei and Ghazanfari 2016) and positive symptoms (Bortolon et al. 2013; Sundag et al. 2016). In addition, Stopa and Waters (2005) proposed that emotional deprivation increased after a depressed mood induction. Thus, emotional deprivation, positive symptoms, and depression may together be related to suicidality in individuals with schizophrenia.

In the current study, negative symptoms were not associated with lifetime suicide attempts or current suicidal ideation. This finding was inconsistent with some studies examining the relationships between negative symptoms and suicide (Luckhoff et al. 2014; McGirr et al. 2006; Tarrier et al. 2004; Umut et al. 2013; Yan et al. 2013). However, these studies did not control for EMSs and depression, so discrepant findings may be partly attributable to different models. Although negative symptoms were not related to suicidality in this study, given the strong overlap between negative symptoms and depression (Barnes and McPhillips 1995; Chadda and Jain 1989; Siris 2000), we hypothesized that negative symptoms may contribute to suicidality by increasing depression. In this study, mediation analyses showed that negative symptoms were not directly related to current suicidal ideation, but they were indirectly associated with current suicidal ideation through depression. Consistent with these findings, Hawton et al. (2005) found that suicidal risk in individuals with schizophrenia is related less to the core psychotic symptoms of schizophrenia and more to affective symptoms. Thus, depression may be important in understanding the association between psychotic symptoms and suicidality. However, future research should assess the mediating role of depression in the relationship between negative symptoms and suicidality using a larger sample in a longitudinal design.

Additional mediation results indicated that the emotional deprivation schema had indirect associations with current suicidal ideation through positive symptoms and depression. This finding may be understood within the framework of the integrated motivational–volitional (IMV) model of suicidal behavior (O'Connor 2011). According to this model, suicidality consists of three phases. The pre-motivational phase includes pre-existing vulnerability factors such as personality traits or environmental factors (e.g., stressful life events) that shape the context in which suicide may occur. The motivational phase refers to threat to self (e.g., social problem solving and ruminative processes) and motivational (e.g., thwarted belongingness, burdensomeness, and social support) moderators for developing suicidal thoughts. Finally, the volitional phase is driven by moderators associated with acting upon the suicidal thoughts (e.g., impulsivity, the acquired capability for suicide, and exposure to suicidal behaviors). Thus, based on the IMV model and the findings of the present research, emotional deprivation may be considered a pre-existing vulnerability factor to suicidality (pre-motivational phase) (O'Connor 2011). Positive symptoms and depression may then strengthen the association between the emotional deprivation schema and suicidal risk in the motivational phase. Further, a history of lifetime suicide

attempts in individuals with schizophrenia in the current study may reflect risk in the volitional phase.

The current study has some important implications. Our results emphasize the importance of the emotional deprivation schema, depression, and positive symptoms in relation to suicidal risk in individuals with schizophrenia. As such, individuals with schizophrenia who have these factors need to be assessed more carefully for warning signs of suicide. Schema therapy (Young 1994; Young et al. 2003) might be effective in modifying the emotional deprivation schema. Individuals with this schema experience a lack of satisfying emotional ties, believe that no one understands them, and feel that they do not receive enough attention, affection, warmth, and emotional support from others. They may not show their need for love and affection to other individuals. Therefore, because these individuals do not expect emotional support, they do not express it, and as a result, they often do not receive it (Young 1994; Young et al. 2003).

Although there is not existing research regarding the effectiveness of schema therapy (ST; Young 1994) on suicidal risk in individuals with schizophrenia, ST may be a useful treatment to modify high EMSs and depressive symptoms in individuals with schizophrenia, thereby reducing their suicidal risk. ST is an integrative theory and approach developed by Young (1994), and this approach has been designed to treat a variety of psychological disorders. Of particular relevance to the current study, past research revealed that ST improves EMSs (Renner et al. 2018; Taylor et al. 2017) and depressive symptoms (Renner et al. 2016, 2018). Thus, this is an important topic to explore in individuals with schizophrenia (Stowkowy et al. 2016). Therefore, ST may modify the emotional deprivation schema by helping individuals with schizophrenia enter warm and close relationships to others; express their needs for emotional support, love, kindness, and affection to others; and receive care and support from others.

This study has several limitations. First, personality disorders (e.g., borderline personality disorder) are important in the study of schemas and suicide but were not assessed in the present study. Further studies are needed to assess differences in schemas between individuals with schizophrenia with and without personality disorders. Second, this study was cross-sectional, and so causal conclusions are not possible. Third, conclusions obtained from a hospitalized sample may not be generalizable to all individuals with schizophrenia. Individuals with schizophrenia who are not under treatment may be at higher risk for suicide than those admitted to treatment. Also, medications may affect the risk of suicide (Palmier-Claus et al. 2013), but we did not control for the effects of medications on suicidal risk. Therefore, antipsychotics and their doses should be considered in future studies. Fourth, there was not a psychiatric control group to compare EMSs in individuals with schizophrenia to individuals with other psychiatric disorders. Fifth, our sample consisted of 82 individuals with schizophrenia; larger samples are undoubtedly needed to draw stronger conclusions. Finally, the use of self-report measures such as the YSQ-SF, the BDI-II, and the BSSI may affect participants' responses and are associated with some reporting biases.

Conclusion

Despite the limitations, the present research indicates that the emotional deprivation schema, depression, and positive symptoms may be associated with suicidality in

individuals with schizophrenia. Results suggest the potential utility of schema theory (Young 1990) in individuals with schizophrenia who are at risk for suicide.

Contributors All authors contributed to and have approved the final manuscript.

Compliance With Ethical Standards

Conflict of Interest The authors declared that they have no conflict of interest.

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