Psychological factors intervening between childhood trauma and suicidality in first-episode psychosis

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ABSTRACT

Several studies have investigated childhood trauma (ChT) and suicidality in psychosis. However, psychological factors intervening between ChT and suicidality are not well understood. The aims of this study were to explore the roles of negative schema and rumination in the relationship between ChT and suicidality in first-episode psychosis (FEP). Participants were 306 patients with FEP who were enrolled in the Korean Early Psychosis Cohort Study, a prospective naturalistic observational cohort study. ChT, suicidality, negative schema, and rumination were evaluated using the Early Trauma Inventory Self Report-Short Form, Columbia Suicide Severity Rating Scale, Brief Core Schema Scale, and Brooding Scale. In addition, psychopathology and depression were evaluated. Structural equation model and a phantom approach were employed to analyze the pathway from ChT to suicidality. We found close associations between ChT, rumination, negative schema, and suicidality. Importantly, negative schema played a direct intervening role in the relationship between ChT and suicidality in patients with FEP. Our findings suggest that targeting negative schema in individuals with FEP exposed to ChT will be an effective strategy for reducing suicidality.

1. Introduction

Suicidality is an enormous public health concern around the world. Notably, the rate of suicide mortality in first-episode psychosis (FEP) was approximately 12 times greater than that in the general population (Dutta et al., 2010). Compared with chronic schizophrenia patients, a higher rate of completed suicide was observed in first-admission and new-onset patients with schizophrenia (Palmer et al., 2005). The reported prevalence of suicide attempts and suicidal ideation in FEP at treatment initiation is as high as 28.2% and 35%, respectively (Bertelsen et al., 2007; Melle et al., 2006). However, suicide is considered a preventable event (Palmer et al., 2005). The proximal risk factors for suicidality in psychosis include shorter illness duration, younger age, higher IQ, male gender, history of suicide attempts, and feelings of worthlessness (Cassidy et al., 2018). Childhood trauma (ChT) has been identified as an important distal risk factor of suicidality in psychosis (Roy, 2005). Individuals with FEP who have been exposed to childhood sexual and/or physical abuse were more likely to attempt

suicide (Conus et al., 2010; Ucok and Bikmaz, 2007). On the other hand, no significant difference in the severity of ChT was observed between patients with and without suicide attempts before first-episode schizophrenia (FES) (Togay et al., 2015). Identifying psychological factors intervening between ChT and suicidal ideation and suicide attempts is crucial for the prevention and treatment of suicidality in patients with FEP. In individuals at risk for psychosis, dysfunctional competence/control beliefs, a lack of positive coping strategies, and depressive symptoms were found to mediate between childhood trauma and suicidality (Baron and Kenny, 1986; Schmidt et al., 2017). However, no previous study has investigated psychological factors linking childhood trauma to suicidality in FEP.

Based on the following studies, we were particularly interested in negative schema and rumination as possible intervening factors in the relationships between ChT and suicidality in FEP. People with chronic psychosis reported extreme negative evaluations of both self and others (Fowler et al., 2006). It was found that individuals with psychosis who reported suicidal ideation held more negative evaluations of self and others than did those without such ideation (Fialko et al., 2006). Moreover, negative beliefs following trauma were closely associated with psychotic experiences (Kilcommons and Morrison, 2005). Rumination, commonly triggered by negative feelings and events, was also a risk factor for suicidality in psychosis (Ahrens and Linden, 1996). Significant associations have been reported between rumination and psychotic symptoms (Hartley et al., 2014), as well as between rumination and depressive (Thomas et al., 2014) and negative symptoms (Halari et al., 2009) in psychosis. Interestingly, dysphoric individuals who engaged in rumination showed much more negative thinking than did dysphoric individuals who distracted themselves from their negative mood (Lyubomirsky and Nolen-Hoekstructural equation modela, 1995). However, these studies have investigated only partial relationships between ChT, negative schema, rumination, and suicidality, not having considered all of these factors in one comprehensive model. Thus, there seems to be a gap in our understanding of how ChT may contribute to suicidality in patients with FEP. This study was conducted to investigate the roles of negative schema and rumination in the link between ChT and suicidality in FEP using structural equation model.

2. Methods

2.1. Participants

The study subjects were participants in the Korean Early Psychosis Cohort Study (Kim et al., 2017). They were recruited from 11 centers (10 national university hospitals and the National Center for Mental Health) across the country. Inclusion criteria were patients aged between 18 and 45 years who met the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), criteria for schizophrenia spectrum disorders (schizophrenia, schizophreniform disorder, and schizoaffective disorder), delusional disorder, brief psychotic disorder, or other specified schizophrenia spectrum and psychotic disorders and who had an IQ >70. All participants had a duration of treated illness <2 years (starting from the time when subjects first took antipsychotics for more than 4 consecutive weeks), which we defined as first-episode psychosis (Breitborde et al., 2009). They had experienced only one psychotic episode (i.e., individuals with a psychotic episode followed by full symptom remission and relapse to another psychotic episode were excluded). Healthy controls were recruited by advertistructural equation modelent in local newspapers. They underwent a psychiatric interview using the screening module of the Structured Clinical Interview for DSM-IV (SCID)-NP (Han and Hong, 2000) to rule out any psychiatric morbidity. All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. All procedures involving human

Table 1
Comparison of childhood trauma between patients and healthy controls.

Variables	Patients (n = 306)	Controls (n = 123)	p-value
Age (yr)	27.28 ± 7.11	28.43 ± 6.24	0.12
Sex			
Female	161 (52.6)	65 (52.9)	0.97
Male	145 (47.4)	58 (47.1)	
Educational status			<0.0001
High school or lower	127 (41.5)	5 (4.1)	
University or higher	179 (58.5)	118 (95.9)	
ETISR-SF			
Total	5.11 ± 4.68	2.97 ± 2.99	<0.0001
General trauma	1.79 ± 2.01	0.89 ± 1.22	0.011
Physical punishment	2.00 ± 1.64	1.36 ± 1.53	0.009
Emotional abuse	1.89 ± 1.78	0.5 ± 1.04	<0.0001
Sexual events	0.65 ± 1.15	0.21 ± 0.52	<0.0001

ETISR-SF, Early Trauma Inventory Self Report-Short Form (Total score ranges from 0 to 27; General trauma score ranges from 0 to 11; Physical punishment score ranges from 0 to 5; Emotional abuse score ranges from 0 to 5; Sexual events score ranges from 0 to 6).

Table 2
Clinical characteristics of the subjects with first episode psychosis.

Variables	Patients (n = 306)
DUP (months)	12.75 ± 21.66
CDSS	5.11 ± 4.68
PANSS	
Composite total	69.04 ± 22.76
Positive total	16.45 ± 6.91
Negative total	17.08 ± 6.76
General total	35.51 ± 11.57
BCSS	
Negative-self	7.07 ± 5.90
Positive-self	11.09 ± 5.45
Negative-others	6.77 ± 6.06
Positive-others	8.99 ± 5.17
BS	
Total	1.43 ± 0.76
Frustration	1.45 ± 0.91
Anger	1.48 ± 0.82
Foolishness	1.36 ± 0.74
Lifetime suicidal ideation	
Yes	164 (53.6)
No	142 (46.4)
Lifetime suicidal attempt	
Yes	59 (19.3)
No	247 (81.7)
Recent suicidal Ideation	
Yes	108 (35.3)
No	197 (64.7)
Recent suicidal attempt	
Yes	33 (10.8)
No	273 (89.2)

Values are presented as mean ± standard deviation, except, lifetime and recent suicidal ideation and attempts which are presented as number (%). BCSS, Brief Core Schema Scales; BS, Brooding scale; CDSS, Calgary Depression Scale for Schizophrenia; DUP, Duration of Untreated Psychosis; PANSS, Positive and Negative Syndrome Scale.

subjects/patients were approved by the Ethics Committee of the Jeonbuk National University Hospital (approval number CUH 2014–11–002) and other participating hospitals. Written informed consent was obtained from all subjects.

2.2. Measures

Demographic (age, sex, and education) and clinical characteristics of patients were collected. The clinical features were evaluated using

Table 3
Zero-order correlations among variables included in the model.

	1	2	3	4	5	6	7	8	9	10	Tolerance	VIF
1	1										.71	1.42
2	.52***	1									.65	1.53
3	.47***	.53***	1								.52	1.91
4	.37***	.32***	.33***	1							.85	1.17
5	.27***	.36***	.51***	.20**	1						.27	3.70
6	.28***	.33***	.53***	.17**	.83***	1					.23	4.42
7	.23***	.28***	.37***	.13*	.71***	.77***	1				.38	2.61
8	.21***	.20***	.38***	.19**	.46***	.45***	.37***	1			.78	1.28
9	.24***	.25***	.45***	.20***	.52***	.51***	.42***	.60***	1		.57	1.75
10	.28***	.29***	.25***	.16**	.26***	.31***	.30***	.37***	.33***	1	.54	1.87

1, General trauma; 2, Physical punishment; 3, Emotional abuse; 4, Sexual events; 5, Frustration; 6, Anger; 7, Foolishness; 8, Negative-self; 9, Negative-others; 10, Suicidality; VIF, Variation inflation factors.
  * $p<.05$.
  ** $p<.01$.
  *** $p<.001$.

the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987; Yi et al., 2001) and Calgary Depression Scale for Schizophrenia (CDSS) (Addington et al., 1990; Kim et al., 2005). Two experienced psychiatrists participated in evaluating the PANSS and CDSS and in making the diagnosis.

The following self-report instruments were used. Four subscales of the Brief Core Schema Scales (BCSS) (Fowler et al., 2006) were collapsed into two item parcels: positive-self and positive-others scores were reverse-scored and summed to create negative-self and negative-others scores, respectively. The Korean version of the BCSS was validated, with Cronbach's α of 0.95 for negative self and 0.86 for negative others (Baek and Lee, 2017). To measure rumination, the Brooding Scale (BS) developed by the present author (Kim et al., 2019) was administered (Cronbach's alpha = 0.93). The BS comprises 15 items divided into three subscales: frustration, anger, and foolishness (five items each). The concepts for the subdomains were borrowed from Buddhist teachings, which state that pain in life or a life of agony comes from attachment to greed, anger, and ignorance/foolishness (i.e., three mental toxins). A higher score on the BS indicates a greater degree of rumination. The Early Trauma Inventory Self Report-Short Form (ETISR-SF), a 27-item questionnaire, was employed to evaluate physical, emotional, and sexual abuse as well as general traumatic experiences that occurred before the age of 18 years. Its reliability and validity were confirmed in Korean patients with depression, with Cronbach's alpha of 0.87 (Jeon et al., 2012). Lifetime and recent suicidal ideation and behaviors were assessed with the Columbia Suicide Severity Rating Scale (C-SSRS) (Pai et al., 2015). We defined suicidality as the presence of lifetime and recent (within 6 months) suicidal ideation and suicide attempts.

2.3. Statistical analysis

At the time of analysis, the total number of screened patients was 314; among these, eight did not meet the inclusion criteria, leaving 306 subjects. The analyses were conducted employing structural equation model with maximum likelihood estimation using the AMOS 22.0 package. Structural equation model encompasses two components: a measurement model (confirmatory factor analysis, CFA) and a structural model. The measurement model specifies the relationship of the latent to the observed variables, whereas the structural model identifies specific relationships among the latent variables. A correlation matrix was inspected to identify the suitability of variables for the structural model. To control for inflated measurement errors due to multiple items for a latent variable, four subscales of the BCSS were collapsed into two item parcels, i.e., negative-self and -others items, by reverse-scoring the positive-self and -others items. To create a continuous variable as an outcome measure, a five-point suicidality scale was developed, where

0 = no lifetime or recent suicidal ideation or attempts, and 4 = presence of all intersections of lifetime and recent suicidal ideation and attempts. Standardized regression weights among the latent variables were estimated, and the significance of indirect effects was confirmed using the bootstrap method. As a structural model provides only the total indirect effects, a phantom model approach was employed to verify specific indirect effects.

3. Results

#### 3.1. Participant characteristics

There were no significant differences in the mean age or the sex ratio between patients and controls. However, controls reported significantly higher educational status. The ETISR-SF scores were all significantly higher in patients compared to controls, even controlling for educational status (Table 1). The rates of lifetime suicidal ideation and attempts among patients were 53.6% (*n* = 164) and 19.3% (*n* = 59), and the rates of recent suicidal ideation and attempts were 35.3% (*n* = 108) and 10.8% (*n* = 33), respectively. Other clinical characteristics are shown in Table 2.

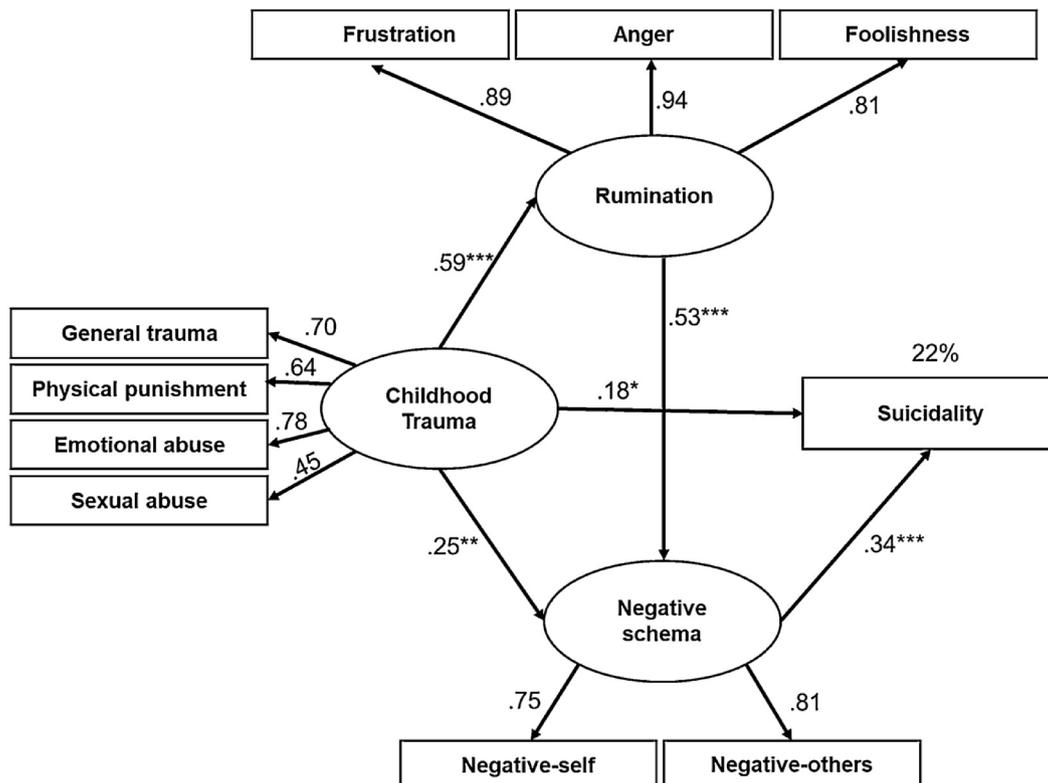#### 3.2. Structural equation model analysis

The correlations among all variables are shown in Table 3. The overall fit of the measurement model was good [comparative fit index (CFI) = 0.98, Tucker–Lewis Index (TLI) = 0.97, root mean square error of approximation (RMSEA) = 0.06, standardized root mean residual (SRMR) = 0.05], with the exception of the chi-square goodness-of-fit test (χ^2 = 50.93, df = 24, *p* < .001). Confirmatory factor analyses revealed that all included indicators were reliable and valid measures of their respective latent variables, as suggested by their significantly acceptable factor loadings (ß = 0.64–.94, *p* < .001), except for sexual abuse (ß = 0.45, *p* < .001). The construct reliability (C.R) and average variance extracted (AVE) were significant and acceptable for all indicator variables, (9.78–23.71 and 0.61–.78, respectively), except for sexual abuse (C.R = 6.99, AVE = 0.43). Although the sexual abuse parameter did not meet the criteria, we included the parameter in the model because of its important role in childhood trauma events. The hypothesized structure model demonstrated an acceptable fit to the observed data on all indices (CFI = 0.97, TLI = 0.96, SRMR = 0.05, RMSEA = 0.07), except for the chi-square goodness-of-fit test (χ^2 = 68.33, df = 30, *p* < .001). The standardized regression weights among the variables were all significant, except that between rumination and suicidality (ß = −0.01, *p* > .05) (Fig. 1a).

Therefore, to identify a more parsimonious model, we deleted the path from rumination to suicidality in the initial structural model and
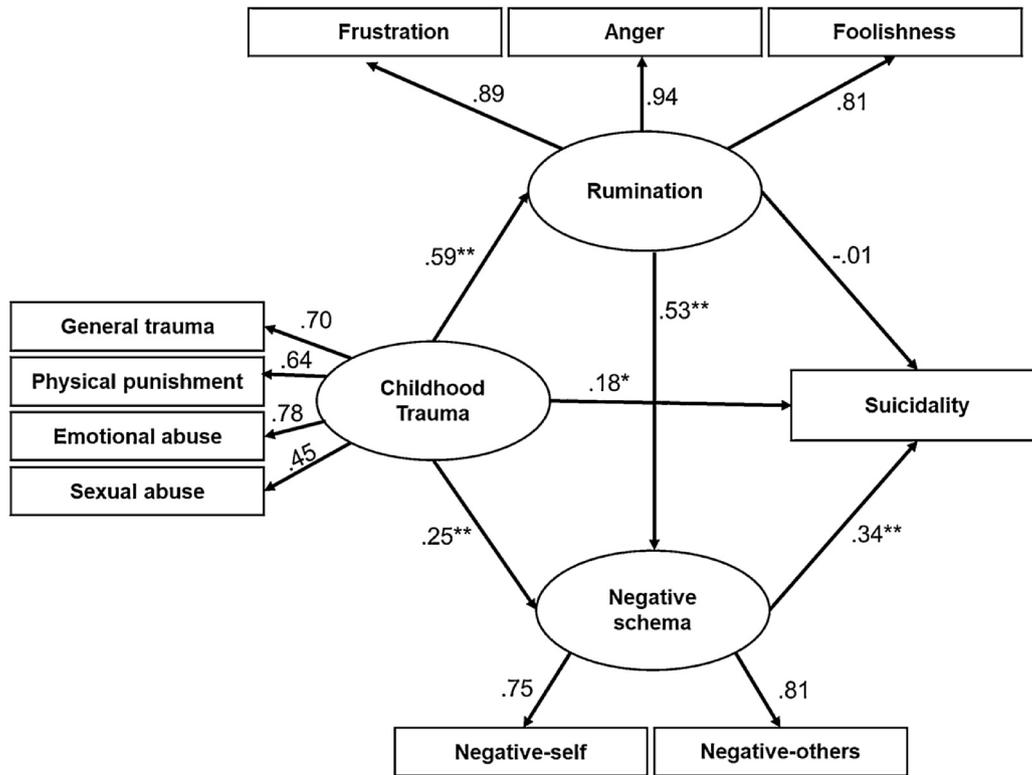
Fig. 1. Rumination and negative schema as mediators of the association between ChT and suicidality. Structural equation model: rectangles represent observed variables; circles, unobserved variables. Numbers by single-headed arrows reflect standardized path efficiency. The percentage values represent the amount of explained variance by predictors. a) Hypothesized structural model, fit indices: chi-square = 68.35; D.F = 30; CFI = 0.97; TLI = 0.96; RMSEA = 0.07; SRMR = 0.05; $p < .001$. b) Final structural model, fit indices: chi-square = 68.35; D.F = 31; CFI = 0.97; TLI = 0.96; RMSEA = 0.06; SRMR = 0.05; $p < .001$. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4
Direct, indirect and total effects of the final structural model.

Endogenous variable	Exogenous variable	Direct effect	indirect effect	Total effect	SMC
Rumination	ChT	0.59***		0.59***	0.34
Negative schema	ChT	0.25**	0.31**	0.56**	0.49
	Rumination	0.53***		0.53***	
Suicidality	ChT	0.18*	0.19**	0.37**	0.22
	Rumination		0.18**	0.18**	
	Negative schema	0.34***		0.34***	

Standardized coefficient estimates are reported. SMC, Squared multiple correlations.

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

conducted an additional analysis. The new model fit showed no significant differences from the initial structural model ($\chi^2 = 68.35$, df $= 31$, $p < .001$, CFI $= 0.97$, TLI $= 0.96$, SRMR $= 0.05$, RMSEA $= 0.06$). In addition, all of the direct effects were significant (Fig. 1b). Hence, this later structural model was considered the final model. The estimates of direct, indirect, and total effects are presented in Table 4. Childhood trauma accounted for 34.3% of the variance in rumination, and childhood trauma and rumination explained 49.0% of the variance in negative schema. Childhood trauma and negative schema together accounted for 21.7% of the variance in suicidality. The direct effects of childhood trauma on rumination and negative schema were significant ($ß = 0.59$, $p < .001$ and $ß = 0.25$, $p < .01$, respectively). Also, the direct effects of rumination on negative schema and of negative schema on suicidality were significant ($ß = 0.53$, $p < .001$ and $ß = 0.34$, $p < .001$, respectively). Importantly, the indirect effect of childhood trauma on suicidality was statistically significant ($ß = 0.19$, $p < .01$), and the direct effect of childhood trauma on suicidality was still significant after other variables were included ($ß = 0.18$, $p < .05$). These results indicate that the indirect path from childhood trauma to suicidality played a partial mediating role. The phantom model approaches showed that the indirect effect of childhood trauma on suicidality through negative schema was significant ($B = 0.08$, $p < .05$). In addition, the indirect effect of childhood trauma on suicidality through serial multiple mediation by rumination and negative schema was also significant ($B = 0.10$, $p < .001$) (Table 5).

4. Discussion

ChT and suicidality are two key factors in understanding the pain and agony that patients with FEP may go through. To help them recover, it is essential that we explore the factors that play intervening roles in the association of ChT with suicidality. We found a direct role of negative schema and an indirect role of rumination in the relationship between ChT and suicidality in patients with FEP.

The mean total ETISR-SF score in FEP patients was 5.11 ± 4.68, a substantially low score compared to that in a previous study (Ruby et al., 2017) using the same scale. However, the total and subscale scores on the ETISR-SF were significantly higher in patients compared to those in controls after controlling for educational status.

This may indicate that Korean patients with FEP are more likely to have been exposed to ChT compared to non-patients. As educational status differed significantly between the two groups, this finding needs to be confirmed with more carefully matched controls. The rates of lifetime suicidal ideation (53.6%) and attempts (19.3%) in patients were relatively high compared to those in previous studies of FEP (Bertelsen et al., 2007) or first-episode schizophrenia (Melle et al., 2006). More importantly, we found significant direct and indirect effects of ChT on suicidality in patients. This finding is in line with previous studies (Conus et al., 2010; Ucok and Bikmaz, 2007) showing detrimental effects of ChT.

The first structural equation model did not show a direct effect of rumination on suicidality in the present study. This was an unexpected finding given that rumination has been reported as a risk factor for suicidality in psychosis (Ahrens and Linden, 1996) and given the significant positive correlation between rumination and suicidality (Table 3). One possible interpretation is that structural equation model analysis based on multiple regression, which accounts for measurement and structural errors, gives different estimates to those of traditional regression. In the final model, rumination was found to have an indirect effect on suicidality and a direct effect on negative schema. This finding indicates that rumination exerts its influence on suicidality, including suicidal ideation and suicide attempts, by activating negative schema rather than directly. The relationship between rumination and negative schema has been confirmed in non-clinical samples of young adults (Balsamo et al., 2015) and in adults with depression (Papageorgiou and Wells, 2003). Considering that dysphoric rumination induced more frequent negative autobiographical memories (Lyubomirsky et al., 1998), it may be that the greater accessibility of negative memories induced by rumination contributes to strengthening negative schema. What's more, rumination in a nonclinical sample was implicated in the maintenance of paranoid ideas (Martinelli et al., 2013) and the development of depression (Thomas et al., 2014), as well as in positive (Hartley et al., 2014) and negative symptoms (Halari et al., 2009) in schizophrenia. Hence, efforts to decrease rumination in psychosis may have huge clinical implications in terms of preventing suicidality and alleviating positive and negative symptoms.

The major findings of the present study point to the close relationships between ChT and negative schema and between negative schema and suicidality, and offer evidence that negative schema play a vital role in the link between ChT and suicidality in patients with FEP. These findings are not surprising given previous reports of close associations between ChT and negative schema in subjects at ultra-high risk for psychosis (Appiah-Kusi et al., 2017) and patients with psychosis (Kilcommons and Morrison, 2005), as well as between negative schema and suicidality in individuals with psychosis (Fialko et al., 2006). Of particular importance is the question of how negative schema affect suicidality. It is well known that negative schema or thoughts are associated with depression (Balsamo et al., 2015) and suicidal behavior (Choon et al., 2015) in young populations. It may be that negative schema increase suicidality in FEP through activation of depression; this question warrants further investigation. The clinical implications of these findings involve the need to prevent suicidality in patients with FEP and the accompanying suggestion that clinicians carefully assess patients' negative views of self and others to evaluate the presence of negative schema and provide therapeutic interventions to reduce them.

Table 5
Direct, specific indirect and total effects using phantom model approach.

Path	Direct effects	Indirect effects	Total effects	B.C
ChT → Negative schema → Suicidality	.17	.08	.36	.11~.29**
ChT → Rumination→ Negative schema → Suicidality		.10		.11~.30**

Unstandardized coefficient estimates are reported; B.C, bias correction.
** $p < .01$.

Recent accumulating evidence suggests psychosis is associated with unhelpful metacognitive coping strategies (Sellers et al., 2018), and metacognitive therapy (MCT) appears to be effective in treating psychosis (Lysaker et al., 2018). Given that MCT targets negative metacognitive beliefs that maintain the cognitive affective syndrome (Normann and Morina, 2018), application of MCT in individuals with FEP may be beneficial in reducing both suicidality and psychotic symptoms.

The present study has several limitations that should be noted. First, because this study employed a cross-sectional design, causality cannot be determined based on the results; questions of causality should be addressed in a prospective study. Second, we obtained information on ChT using a self-report scale, and patients' reluctance to disclose sensitive information may have led to an underestimation of such events. In future studies, structured interview tools may be preferred. Third, patients in this study were treated in a university hospital setting, which could limit the generalizability of the findings. Despite these limitations, the present study is the first to explore the factors intervening between childhood trauma and suicidality in FEP.

In conclusion, the present study demonstrated close associations among ChT, rumination, negative schema, and suicidality in patients with FEP. Furthermore, negative schema played a direct intervening role in the relationship between ChT and suicidality in these patients. These findings highlight the need for careful evaluation of the relationship between childhood trauma and suicidality and the importance of providing therapeutic interventions to reduce the psychological determinants of suicidality.

CRediT authorship contribution statement

Yin Cui: Methodology, Formal analysis, Writing - original draft, Visualization. **YanHong Piao:** Resources, Investigation. **Sung-Wan Kim:** Resources, Investigation. **Bong Ju Lee:** Resources, Investigation. **Jung Jin Kim:** Resources, Investigation. **Je-Chun Yu:** Resources, Investigation. **Kyu Young Lee:** Resources, Investigation. **Seung-Hee Won:** Resources, Investigation. **Seung-Hwan Lee:** Resources, Investigation. **Seung-Hyun Kim:** Resources, Investigation. **Shi Hyun Kang:** Resources, Investigation. **Euitae Kim:** Resources, Investigation. **Namhee Kim:** Formal analysis. **Young-Chul Chung:** Conceptualization, Supervision, Writing - review & editing.

Declaration of Competing Interest

None arising from this research.

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