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The role of metacognition and social cognition in childhood trauma effecting on prognosis: 1-year follow-up study in patients with first-episode schizophrenia

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Abstract

Background Childhood trauma (CT) is common in first episode schizophrenia (FES), affecting prognosis and functionality. However, the mechanisms by which CT effects prognosis are not clear. This study aimed to investigate how metacognition (MC) and social cognition (SC) mediate effects of CT on symptoms in FEP.

Methods 52 first episode schizophrenia patients who were diagnosed for first time and had been symptomatic for at most 2 years were included. Patients were administered Metacognition Assessment Scale-Abbreviated to assess MC; Reading the Mind in the Eyes Test, Facial Emotion Recognition and Discrimination Tests to assess SC; Positive and Negative Syndrome Scale to assess psychopathology and Global Assessment of Functioning Scale to assess functionality at first interview. Patients were followed up for 1 year. At second interview the above scales and Childhood Trauma Questionnaire-33 were applied to 38 patients who met remission criteria.

Results MC and SC modulated effects of CT on negative symptoms, but not on positive symptoms. CT had different effects on symptoms, MC and SC skills in episode and remission. Pharmacological treatment was not sufficient to improve these skills.

Conclusions MC and SC skills are important in modulating CT effecting on prognosis and non-pharmacological interventions should be developed to improve these skills.

Clinical trial number Not applicable.

Highlights

  · The importance of metacognition and social cognition on prognosis is still not clear enough in first episode schizophrenia patients.
  · While CT has a direct effect on positive psychotic symptoms, its effects on negative symptoms are mediated by metacognition and social cognition.

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Introduction

Childhood trauma (CT) causes increased susceptibility to stressors [1, 2], affects mental health in adulthood and is associated with various mental illnesses. Studies indicate that CT is 2.7 times more common in patients diagnosed with psychosis than in healthy controls [3, 4]. Also in psychosis patients with CT have more severe positive symptoms [5] and deficits in metacognitive [6–8] and social cognitive skills [9–12].

Metacognition is a concept that draws attention to thinking about thinking or cognitions about cognitions [13–16]. It includes the ability to perceive that oneself and others have different mental processes that they can influence each other through social communication. These mental processes can change over time, and the ability to create an integrated narrative with this mental information requires metacognitive skills [17]. Considering these functions, it is obvious that metacognition has an important role in psychopathology. Therefore, it is also important to evaluate metacognitive skills accurately. In recent years Metacognition Assessment Scale-Abbreviated (MAS-A) was developed as a good predictor of metacognition and with this scale metacognitive abilities was represented by 4 subscales: *Self-Reflectivity (S), Awareness of the Other's Mind (O), Decentration (D), Mastery (M).* The subscales can be defined: *Self-Reflectivity*, as the ability to think about one's own mental states and emotions and use this information; *Awareness of the Other's Mind*, as the ability to think about others' mental states and emotions and use this information; *Decentration*, as the ability to see the world as existing alongside others with independent motivations; *Mastery*, as the ability to apply effective strategies to cope with psychological problems and related distress [18, 19].

Although people with better social cognitive abilities also have better metacognitive abilities [17, 20], it has been shown that these two skills are actually different and metacognition is a more comprehensive umbrella concept [21, 22]. Social cognition can be defined as a person's perception and interpretation of thoughts, intentions and behaviors of others and use these social situations to make conscious decisions or attitudes. The American National Institute of Mental Health examined social cognition under four main headings: emotion processing (ER), theory of mind (ToM), social perception and attribution bias. Emotion processing is the ability to recognize, understand, regulate and respond appropriately to their own and others' emotions. ToM is the ability to understand and predict others's thoughts, intentions, beliefs and emotions. Social perception is the ability to accurately perceive and evaluate social cues and social environments. Attribution bias refers to the tendency to attribute internal or external factors when explaining others's behaviors [23].

Few studies examining the relationship between CT and metacognition at different stages of schizophrenia have demonstrated a relationship between CT and deficits across various domains of metacognition [8, 24, 25]. A similar relationship has been demonstrated between CT and social cognition in patients with schizophrenia. It has been reported that neglect has negative effects on social cognitive development [9, 11, 26–28] and SA on emotional ToM [29]. On the other hand, another study found no association between ToM and CT in patients with chronic psychosis, acute first episode psychosis (FEP) or those at high risk for psychosis [30]. These results raise questions about whether social cognitive deficits in schizophrenia patients are specific to the disease [26, 27].

There are conflicting results in studies examining the relationship between CT and symptomatology [31]: some studies found significant relationship with positive symptomatology [32–37], other studies found significant relationship with negative symptomatology [38, 39]. In long-term follow-up studies, some studies have found that CT reduces the improvement in positive [40, 41], negative [42] and depressive [43] symptoms. In a two-year follow-up study, no significant relationship was found between CT and symptom remission [44]. These results suggest that there are still uncertainties about how CT affects prognosis in patients with psychosis.

It has been shown that there are metacognitive and social cognitive deficiencies in first episode schizophrenia (FES), and these skills are thought to be a trait [45, 46]. However, metacognitive skills also may decrease when people are under threat and increase in safe environments, depending on the current situation [47]. Although it is thought that social cognitive skills, especially ToM, are not affected by the chronicity of psychosis or remission [48, 49]; there are different results

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in literature regarding emotion recognition (ER) skills. Although most authors think that ER is not affected by the chronicity of psychosis [50, 51], some authors report that it deteriorates over time [52], while other authors report that better results can be obtained with treatment in chronic psychosis [49, 53].

In FES, metacognitive and social cognitive deficits have been shown to be related to functionality in long-term follow-up [49, 54]. Pharmacological treatments have not been sufficient to improve these skills. For this reason, it has recently been discussed that non-pharmacological intervention methods are necessary [55, 56]. It has been shown that metacognitive and social cognitive interventions and therapy methods can improve these skills [57–61] and have a positive effect on functionality in long-term follow-up [62].

In the early stages of the disease, FES patients have a shorter history of treatment and interventions compared to those with chronic psychosis. This allows the evaluation of metacognitive and social cognitive skills while minimizing the influence of disease progression and medications. In addition, it is possible to observe more clearly the changes in metacognitive and social cognitive skills over time and how these skills affect the course of the disease in FES patients. We hypothesized that CT causes worse MC and SC abilities in FES patients, which negatively impacts functionality and symptomatology. So the aim of this study is to examine the relationship between chilhood trauma with metacognition and social cognition in FES patients. The findings of this study may contribute to the development of new treatment strategies and improvement of existing treatment methods in FES.

Methods
Participants
This study included 52 patients with shizophrenia according to Diagnostic and Statistical Manual of Mental Disorders- 5th Edition (DSM-5) diagnostic criteria [63] -in first episode- between the ages of 18–65. Patients who were within the first 2 years of the onset of symptoms [64], were diagnosed for the first time and had not received adequate treatment (treatment with 6 mg/day haloperidol or equivalent for at least 6 weeks [65]) were included in study as FES. Those with affective symptoms, comorbid diseases that could affect cognitive function (such as mental retardation, dementia, delirium, stroke), active substance use or substance-related psychosis were excluded from the study.

Most authors have considered patients who have not received adequate treatment within the first 2–5 years after the onset of psychotic symptoms as first episode [66]. In this study, in order to eliminate the chronicity of disease [67, 68] and the confounding effect of

medications, patients were selected from a sample of those who were first diagnosed and did not receive adequate treatment, at most 2 years after the onset of symptoms [64]. Patients were evaluated in both acute and remission periods.

Procedure
This study was conducted in Ankara City Hospital and Gülhane Training and Research Hospital Psychiatry Clinics between 19/10/2022 to 17/10/2023. Ethics committee approval was obtained from Ankara City Hospital No. 1 Clinical Research Ethics Committee in accordance with the Declaration of Helsinki, dated 19/10/2022 and numbered E1/2976/2022.

A total of 70 patients who applied to these two clinics from the outpatient clinic or emergency department and were suspected to have first-episode psychosis were hospitalized and evaluated for further examination, differential diagnosis and clarification of the FES diagnosis. Within one week of their hospitalization, patients were consecutively interviewed to assess their diagnosis, as well as their metacognitive and social cognitive skills. In the first interview, informed consent was obtained and sociodemographic data were noted. The diagnoses of the patients were clarified with the Structured Clinical Interview for DSM-5 Disorders (SCID-5) [69]. 10 patients with affective symptoms (3 psychotic depression, 7 psychotic mania) and 5 patients with a diagnosis of delusional disorder at the first interview were excluded from the study. In addition, 3 patients whose diagnosis was changed to schizoaffective disorder due to an affective episode during follow-up interviews were excluded (2 non-psychotic depression and 1 non-psychotic mania).

In the first interview conducted with 52 patients who met the inclusion criteria: Metacognition Assessment Scale-Abbreviated (MAS-A) to assess metacognition; Reading the Mind in the Eyes Test (RMET) to assess ToM skills; Facial Emotion Identification (FEIT) and Discrimination (FEDT) Tests to assess ER skills; Positive and Negative Syndrome Scale (PANSS) to assess psychopathology; Global Assessment of Functioning Scale (GAS) to assess functionality were applied. For the MAS-A scale, a 45–50 min clinical interview was conducted with the patient and the interview was audio-recorded. Metacognitive skills were scored by listening to the audio recordings. The CTQ-33 scale was not administered in the first interview due to concerns that its application during the active psychotic period might not yield accurate results.

52 patients who met the inclusion criteria at the first interview, agreed to participate in the study and were diagnosed with first-episode schizophrenia and schizophreniform disorder were started on treatment and the PANSS was administered by the same clinician every 3–4

weeks. The patients were evaluated for remission according to the criteria of the Remission in Schizophrenia Working Group (RSWG) [70]. According to the RSWG definition, which focuses on the three basic dimensions of the disorder (negative symptoms, disorganization and psychotic symptoms), a score of 3 or less from the items of positive symptoms such as delusions (p1), conceptual disorganization (p2) and hallucinatory behavior (p3); negative symptoms such as blunted affect (n1), passive/apathetic social withdrawal (n4), lack of spontaneity and flow of conversation (n6); general psychopathology such as mannerisms and posturing (g5), unusual thought content (g9) is considered as remission. After 1 year of follow-up, 6 patients did not meet the remission criteria during the study period. 1 patient died by suicide, 1 patient was officially reported as missing, 1 went to prison and 5 patients did not attend follow-up evaluations. Therefore remission assessment could not be made

for these patients. A remission interview was conducted with 38 patients who met the remission criteria according to the RSWG criteria and the scales were repeated. Additionaly the CTQ-33 was applied. Statistics on CT were performed on these 38 patients and other analyses were performed on 52 patients who met the inclusion criteria. Participants and precedure is shown in Fig. 1.

Measures
Structured Clinical Interview for DSM-5 Disorders (SCID-5): It was developed to diagnose mental disorders included in DSM-5 using a structured clinical assessment method [69, 71].

Positive and Negative Syndrome Scale (PANSS): It is the most widely used measures to evaluate psychopathology of schizophrenia. It consists of 30 items and 3 subscales (positive, negative and general) [72, 73].
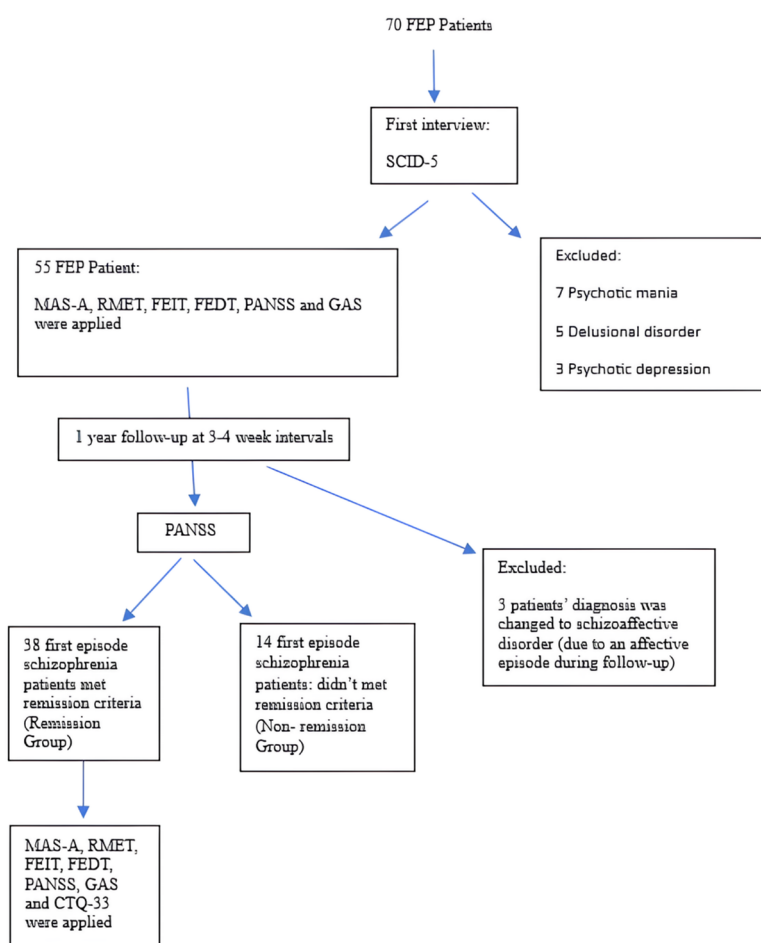
SCID-5: Structured Clinical Interview for DSM-5 Disorders; MAS-A: Metacognition Assessment Scale-Abbreviated; RMET: Reading the Mind in the Eyes Test; FEIT: Facial Emotion Identification Test; FEDT Facial Emotion Discrimination Test; PANSS: Positive and Negative Syndrome Scale; GAS (Global Assessment of Functioning Scale); CTQ-33: Childhood Trauma Questionnaire-33

Fig. 1 Participants and procedure

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Childhood Trauma Questionnaire-33 (CTQ-33): This is a frequently used scale to assess CT. It is a self-report scale consisting of a total of 33 items. It includes positive and negative statements measuring areas such as emotional abuse (EA), physical abuse (PA), physical neglect (PN), emotional neglect (EN), sexual abuse (SA), over protection-overcontrol (OP-OC) and 3 items measuring denial [74, 75].

Metacognition Assesment Scale- Abbreviated (MAS-A): This scale is frequently used to assess MC skills. First, a semi-structured interview is conducted with participant and MAS-A is scored by interviewer based on this. MAS-A includes four subscales: "Self-Reflectivity" (S), "Awereness of the Others Mind" (O), "Decentration" (D) and "Mastery" (M) [76, 77].

Reading the Mind in the Eyes Test (RMET): This is a scale used to evaluate ER and ToM skills. There are 32 pictures showing the eye contours and 4 options for each picture [78, 79].

Facial Emotion Identification (FEIT) and Discrimination (FEDT) Tests: These are scales used to measure ER skills. FEIT: Contains 19 black and white face photographs and six main emotion options for each photograph. FEDT: Contains 30 pairs of black and white face photographs [80, 81].

Table 1 Sociodemografic and clinical features of the participants

Age(mean + SD)		29.3 ± 9.3
Gender n(%)	female	17 (%32.7)
	male	35 (%67.3)
Marital Status	single	40 (%76.9)
	married	12 (%23.1)
Education Status	primary school	8 (%15.4)
	middle school	11 (%21.2)
	high school	19 (%36.5)
	associate degree	1 (%1.9)
	university student	6 (%11.5)
	university	7 (%13.5)
Working Status	unemployed	31 (%59.6)
	student	10 (%19.2)
	working	10 (%19.2)
	retired	1 (%1.9)
Smoking	no	18 (%34.6)
	yes	34 (%65.4)
Alcohol Use Disorder	no	49 (%94.2)
	yes	3 (%5.8)
Substance Use	no	31 (%59.6)
	yes	21 (%40.4)
Comorbid Disease	no	42 (%80.8)
	yes	10 (%19.2)
Remission	no	14 (%26.9)
	yes	38 (%73.1)

Categorical variables are given as number (percent) (n(%)), numerical variables are given as mean ± standard deviation (mean ± SD)

Global Assessment of Functioning Scale (GAS): This is a scale used to assess functionality. This scale assesses psychological, social and occupational functionality, but does not assess functionality related to physical conditions. The scale is scored by clinician [82].

Statistical analysis
Statistical analyses were performed using IBM SPSS for Windows Version 26.0 and Jamovi 2.3.28 package programs. The conformity of data to normal distribution was tested using the Kolmogorow-Smirnov Test. Numerical descriptive information was expressed with mean and standart deviation. Categorical variables were expressed with number and percentage and simple descriptive statistics were used for these variables. The distribution of categorical variables and the difference in variables were determined using the Chi-Square test. Independent sample T-Test, paired sample T-Test, one-way ANOVA analyses were applied to numerical variables. Bonferroni correction was applied for post-hoc corrections. Relationship between numerical variables was evaluated using Pearson correlation analyses. The assumptions of multivariate normality and multicollinearity for the regression models were assessed. Linear regression models were used for variables meeting the criteria for normal distribution, while generalized linear models were employed for variables that did not meet the normality criteria. The effect sizes for the regression models are represented using f^2. Analysis of related variables was done using hierarchical regression analysis. Models were performed using Jamovi 2.3.28 package programs. The significance level was taken as $p < 0.05$.

Results
Sociodemographic and clinical characteristics
The sociodemographic and clinical characteristics of all participants are shown in Table 1.

Scale points of episode and remission for 38 patients who met the remission criteria are shown in Table 2.

When the remission and non-remission groups were compared in terms of age and duration of symptoms, no significant difference was found ($p > 0.05$). When the remission and non-remission groups were compared in terms of scale scores during the episode, it was seen that the remission group scored significantly higher than the non-remission group only in the MAS-A S subscale ($p < 0.05$).

The relationship between childhood trauma and MC, SC, symptomatology
In episode phase, significant relationships were observed between CTs and scale scores. PANSS Positive scores showed significant positive correlations with EA ($r = 0.362$, $p < 0.05$) and PA ($r = 0.390$, $p < 0.05$).

Table 2 Scale points of episode and remission (mean ± SD)

		Episode	Remission	*p*
PANSS points	PANSS positive	21.2(± 5.0)	9.3(± 2.2)	< 0.001
	PANSS negative	22.7(± 5.4)	14.1(± 4.6)	
	PANSS general	37.4(± 7.1)	25.0(± 5.6)	
	PANSS total	82.2(± 12.6)	48.0(± 10.5)	
MAS-A points	S	4.8(± 1.4)	6.6(± 1.9)	< 0.001
	O	3.7(± 1.2)	3.8(± 1.3)	0.578
	D	1(± 0.7)	1.7(± 0.6)	< 0.001
	M	3.4(± 1.9)	6.3(± 1.8)	< 0.001
	Total	12.9(± 4.2)	18.4(± 4.3)	< 0.001
RMET		19.3(± 5.3)	19.4(± 5.2)	0.826
FEIT		11.2(± 3.1)	11.9(± 2.9)	0.202
FEDT		24.6(± 3.3)	25.0(± 3.2)	0.494
GAS		20.5(± 6.9)	54.3(± 15.0)	< 0.001
CTQ-33	EA		8.1(± 4.6)	
	PA		6.2(± 2.2)	
	PN		9.1(± 3.6)	
	EN		12.1(± 5.3)	
	SA		5.4(± 1.1)	
	OP-OC		10.6(± 4.3)	
	Total		51.9(± 17.0)	

Categorical variables are given as number (percent) (n(%)). numerical variables are given as mean ± standard deviation (mean ± SD). S: Self-Reflectivity; O: Awareness of the Other's Mind; D: Decentration; M: Mastery; Total: Total Score; EA: Emotional Abuse; PA: Physical Abuse; PN: Physical Neglect; EN: Emotional Neglect; SA: Sexual Abuse; OP-OC: Overprotection-Overcontrol

Additionally, FEIT ($r = 0.408$, $p < 0.05$) and FEDT ($r = 0.382$, $p < 0.05$) scores were significantly positively correlated with SA.

In remission phase, PANSS General scores were significantly correlated with PA ($r = 0.344$, $p < 0.05$), PN ($r = 0.381$, $p < 0.05$), SA ($r = 0.497$, $p < 0.01$), and CTQ-33 total score ($r = 0.385$, $p < 0.05$). PANSS Total scores showed a significant positive correlation with SA ($r = 0.455$, $p < 0.01$). MAS-A total scores ($r = 0.432$, $p < 0.01$), along with the S ($r = 0.383$, $p < 0.05$) and O ($r = 0.415$, $p < 0.01$) subscales, were positively correlated with OP-OC. Regarding cognitive tests, RMET scores were significantly correlated with OP-OC ($r = 0.418$, $p < 0.01$). FEIT scores showed positive correlations with EN ($r = 0.375$, $p < 0.05$) and OP-OC ($r = 0.454$, $p < 0.01$). Similarly, FEDT scores were significantly correlated with both EN and OP-OC ($r = 0.363$, $p < 0.05$).

The factors affecting metacognition

Hierarchical regression analysis of factors affecting metacognition was performed. It was found that during the episode: S subscale score was negatively correlated with negative symptomatology total score ($p < 0.05$); O subscale score was: negatively correlated with negative symptomatology total score ($p < 0.01$) and EA ($p < 0.01$); and positively correlated with OP-OC score ($p < 0.01$). D subscale score was negatively correlated with EA ($p < 0.05$), and positively correlated with OP-OC score ($p < 0.01$). M subscale was negatively correlated with negative symptomatology total score ($p < 0.01$) and positively correlated with OP-OC score ($p < 0.05$). During remission: O subscale was negatively correlated with NTOT ($p < 0,05$); D subscale was negatively correlated with EA ($p < 0.05$) and positively correlated with OP-OC ($p < 0.05$); M subscale was negatively correlated with NTOT ($p < 0,05$) and positively correlated with EA ($p < 0,05$). The normality and multicollinearity assumptions of the regression analyses were met (except for remission O and M scores) and the model effect sizes were generally large. Since the Remission O and M models are nonparametric, a nonparametric regression model was used in them (generalized linear model) (Table 3; for the effect power of models in Table 3, see Supplementary Material 1).

The factors affecting social cognition

Hierarchical regression analysis of factors affecting social cognitive skills was performed (Table 4; for the effect power of models in Table 4, see Supplementary Material 1). The analysis found that during episode: SA was positively associated with the ability to perceive negative and neutral facial expressions ($p < 0.05$ each); emotional ($p < 0.01$) and sexual ($p < 0.05$) abuse were positively, EN ($p < 0.01$) was negatively associated with the ability to percieve neutral facial expressions; SA was positively associated with FEIT; EA ($p < 0.05$) and SA ($p < 0.01$) were positively, EN was negatively ($p < 0.05$) associated with FEDT. During remission: PA was negatively ($p < 0.05$) and EN was positively ($p < 0.05$) associated with FEIT.

Table 3 Regression analysis of factors affecting metacognition

		Episode			Remission		
		Beta	t	Sig.	Beta	t/z	Sig.
S	PTOT	0.000	-0.003	0.998	0.223	1.202	0.240
	NTOT	-0.419	-2.561	**< 0.05**	-0.314	-1.81	0.081
	GTOT	0.132	0.734	0.469	0.062	0.324	0.748
	EA	-0.421	-1.164	0.254	-0.393	-1.024	0.315
	PA	-0.237	-1.049	0.303	0.029	0.12	0.905
	PN	-0.071	-0.405	0.689	-0.149	-0.806	0.427
	EN	-0.143	-0.492	0.627	0.091	0.297	0.769
	SA	-0.013	-0.082	0.935	-0.107	-0.638	0.529
	OP-OC	0.667	2.0ca	**0.054**	0.642	1.826	0.078
O	PTOT	0.015	0.104	0.918	1.033	0.242	0.810
	NTOT	-0.465	-3.329	**< 0.01**	0.848	-2.599	**< 0.05**
	GTOT	0.188	1.224	0.231	1.056	0.887	0.383
	EA	-0.874	-2.829	**< 0.01**	1.248	0.510	0.614
	PA	0.162	0.843	0.407	1.071	0.490	0.628
	PN	-0.086	-0.573	0.571	0.973	-0.110	0.913
	EN	-0.094	-0.378	0.708	0.985	-0.014	0.989
	SA	-0.185	-1.368	0.182	1.699	1.216	0.234
	OP-OC	1.104	3.897	**< 0.01**	0.927	-0.288	0.776
D	PTOT	-0.318	-1.992	0.056	-0.042	-0.239	0.813
	NTOT	-0.113	-0.755	0.457	-0.296	-1.795	0.083
	GTOT	0.033	0.2	0.843	0.099	0.545	0.59
	EA	-0.821	-2.484	**< 0.05**	-0.943	-2.58	**< 0.05**
	PA	0.116	0.562	0.579	0.076	0.335	0.74
	PN	0.114	0.711	0.483	0.080	0.453	0.654
	EN	-0.421	-1.589	0.123	0.200	0.683	0.5
	SA	-0.188	-1.294	0.206	-0.239	-1.495	0.146
	OP-OC	1.136	3.749	**< 0.01**	0.808	2.414	**< 0.05**
M	PTOT	0.057	0.389	0.7	0.994	-0.039	0.969
	NTOT	-0.517	-3.805	**< 0.01**	0.857	-2.062	**< 0.05**
	GTOT	0.317	2.124	0.43	1.039	0.524	0.604
	EA	-0.016	-0.052	0.959	3.757	2.577	**< 0.05**
	PA	-0.359	-1.917	0.065	1.020	0.120	0.905
	PN	-0.067	-0.462	0.648	1.126	0.402	0.691
	EN	-0.359	-1.491	0.147	1.213	0.154	0.879
	SA	0.126	0.957	0.347	1.168	0.300	0.766
	OP-OC	0.626	2.272	**< 0.05**	0.715	-1.071	0.293

S: Self-Reflectivity; O: Awareness of the Other's Mind; D: Decentration; M: Mastery; EA: Emotional Abuse; PA: Physical Abuse; PN: Physical Neglect; EN: Emotional Neglect; SA: Sexual Abuse; OP-OC: Overprotection-Overcontrol; PTOT: PANSS Positive Symptomatology Total Score; NTOT: PANSS Negative Symptomatology Total Score; GTOT: PANSS General Symptomatology Total Score

The regression models met the assumptions of normality (Except FEDT) and multicollinearity. In FEDT model, generelized estimating equation was performed because normality assumptions were not met. The effect sizes were generally low-medium (FEIT remission and FEDT remission effect sizes were medium-large).

The models explaining the relationship between childhood trauma and negative symptoms

The relationship between CT, metacognition, social cognition and negative symptoms during the episode is shown in Fig. 2.

The relationship between CT, metacognition, social cognition and negative symptoms during remission is shown in Fig. 3.

The two models above are working well and the models that were tried to be installed other than these did not work well, so they were not added as figures.

Discussion

This study examined the effects of CT on metacognition and social cognition in FES. In a few previous studies, the effects of CT on metacognition and social cognition in patients with schizophrenia and schizoaffective disorder at different stages were investigated and conflicting

Table 4 Regression analysis of factors affecting social cognition

		Episode			Remission		
		Beta	t/z	Sig	Beta	t/z	Sig
RMET-N	EA	0.498	1.868	0.072	-0.231	-0.745	0.462
	PA	-0.081	-0.381	0.706	0.078	0.334	0.74
	PN	0.038	0.232	0.818	-0.082	-0.449	0.657
	EN	-0.308	-1.199	0.24	0.232	0.847	0.404
	SA	0.358	2.411	**<0.05**	0.235	Oca.38	0.178
RMET-P	EA	0.042	0.145	0.886	-0.118	-0.364	0.718
	PA	0.081	0.348	0.731	0.058	0.238	0.814
	PN	0.224	1.237	0.226	-0.026	-0.139	0.89
	EN	0.072	0.258	0.799	0.243	0.851	0.401
	SA	0.126	0.776	0.444	0.164	0.925	0.362
RMET-NO	EA	0.776	2.969	**<0.01**	0.087	0.286	0.777
	PA	-0.18	-0.866	0.394	-0.104	-0.455	0.653
	PN	0.056	0.347	0.731	-0.198	-1.114	0.274
	EN	-0.737	-2.923	**<0.01**	0.168	0.624	0.537
	SA	0.385	2.647	**<0.05**	0.15	0.899	0.376
FEIT	EA	0.159	0.813	0.422	0.030	0.187	0.853
	PA	-0.368	-1.119	0.271	-0.561	-2.061	**<0.05**
	PN	-0.070	-0.451	0.655	-0.140	-1.090	0.284
	EN	-0.046	-0.287	0.776	0.349	2.607	**<0.05**
	SA	11.095	2.414	**<0.05**	0.502	1.319	0.196
FEDT	EA	0.503	2.721	**<0.05**	0.049	0.262	0.795
	PA	-0.576	-1.850	0.074	-0.141	-0.450	0.656
	PN	0.099	0.676	0.504	-0.272	-1.845	0.074
	EN	-0.393	-2.568	**<0.05**	0.280	1.821	0.078
	SA	13.768	3.166	**<0.01**	0.656	1.500	0.143

EA: Emotional Abuse; PA: Physical Abuse; PN: Physical Neglect; EN: Emotional Neglect; SA: Sexual Abuse; OP-OC: Overprotection-Overcontrol; RMET-N: RMET negative expressions total score; RMET-P: RMET positive expressions total score; RMET-NO: RMET neutral expressions total score; FEIT: Facial Emotion Identification Test; FEDT: Facial Emotion Discrimination Test

results were obtained. In this study, FES patients were examined both episode and remission period, and four primary findings were obtained. First one of the primary findings is that although the history of CT is associated with the severity of positive symptoms during the episode, metacognition and social cognition do not have an effect on this relationship. Second, the effect of CT on negative symptoms emerges through metacognition and social cognition. Third, during episode and remission periods the effects of CT may differ. Fourth, in FES patients, awareness of others minds and social cognitive abilities could not be improved with pharmacological treatment alone in the remission group.

The relationship between childhood trauma with metacognition and symptomatology

In this study, it was found that in FES patients with a history of EA in childhood: awareness of others' mind and D abilities were worse during the episode and only D ability was worse during the remission period. According to the model, while CT has no direct effect on metacognitive skills during the episode, and during remission it was found that SA history negatively affects awareness

of others' mind ability and increases negative symptomatology. These findings are consistent with [24] in which study they found that SA history was higher who were not aware of the others' emotions in non- acute phase schizophrenia patients. Aydin et al. [8] found a connection between EA and poor D skills and Jansen et al. [25] found a connection between CT and poor M skills.

This findings suggest that FES patients who were sexually abused in childhood avoid the mental states of others, are not aware of the mental states of others and have difficulty looking at the world from the perspective of others. This may be because those who have been sexually abused perceive other people and world as more untrustworthy and unfair, and invest less in knowledge about other people's minds [83]. In addition, during remission, SA victims had difficulty awareness of others mind, leading to an increase in negative psychopathology scores. This finding is consistent with studies showing that metacognitive skills are significantly related to negative symptoms at follow-up [84]. In correlation analysis, a relationship was seen between CT and positive psychopathology, but this relationship was not detected in the models. This suggests that metacognition and social
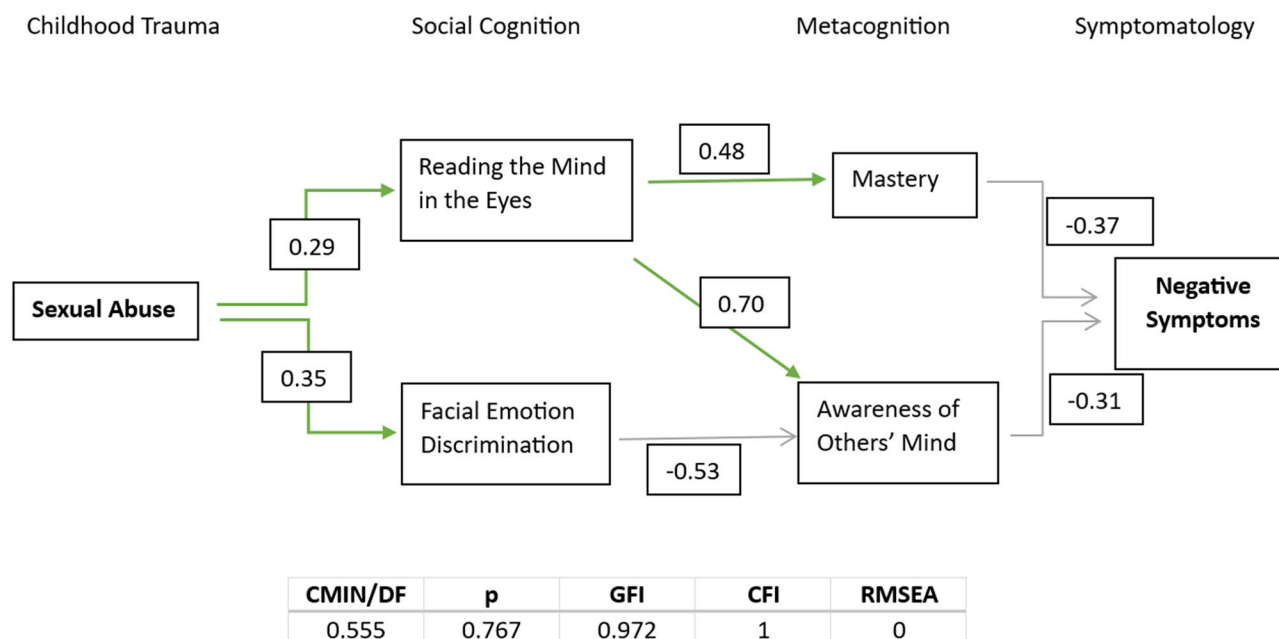
CMIN/DF	p	GFI	CFI	RMSEA
0.555	0.767	0.972	1	0

The relationship between childhood trauma, metacognition, social cognition and negative symptoms during the episode

Fig. 2 Sexual abuse positively affects Reading the Mind in the Eyes Test (RMET) and Facial Emotion Discrimination Test (FEDT) during the episode in first- episode schizophrenia patient. In other words, exposure to sexual trauma positively affects Emotion Recognition and Theory of Mind (ToM) skills, but it has no direct effect on metacognitive skills during the episode. RMET positively affected Mastery and Awareness of Others' Mind skills, while FEDT negatively affected Awareness of Others' Mind skill. In other words, having better ToM skills predicted better metacognitive skills such as Mastery and Awareness of Others' Mind, while better Emotion Recognition skills seemed to negatively affect metacognitive skills during the episode. Better metacognitive skills such as Mastery and Awareness of Others' Mind reduced negative symptoms

cognition do not modulate the relationship of trauma with positive symptoms, but its effect on negative symptoms is mediated by metacognition and social cognition, which is explaining our first and second primary findings. Dissociative mechanisms may regulate the relationship between CT and positive symptomatology [85]. Studies that can explain this relationship in the FES sample would be interesting.

CT affects social cognition differently in episode and remission

In the models, during the episode, SA scores negatively affected awereness of others' mind ability through ER skills. However, the fact that SA positively affected awereness of others' mind and D abilities through ToM skills may be related to a protective adaptation during the episode. This positive effect of SA history on cognitive skills during the episode may reflect a state of hyperarousal such as hypervigilance, which may negatively affect the patient's clinical state and prognosis. The lack of a reference range or threshold value for cognitive skills in psychotic patients may be confusing in interpreting pathological changes. In remission, SA negatively affected metacognitive skills such as awereness of others' mind

ability. This difference shows that sexual trauma has different effects in episode and remission stages of disease, which is explaining our third primary finding.

The effect of Pharmacological treatment on MC and SC

Our fourth primary finding, was that significant improvements were observed in all metacognitive skills during remission, except for awereness of others' minds, with drug treatment, while no significant differences were observed in social cognitive skills. Since MC is associated with symptomatology too, there may have been improvements in MC skills, except for awareness of others mind, along with improvement in psychotic symptoms with pharmacological treatments. So, this may be important in terms of investigating the contribution of metacognitive interventions to awareness of others mind ability, considering their effectiveness. In addition, this finding emphasizes the importance of social cognitive interventions [86].

Our secondary findings are as follows:
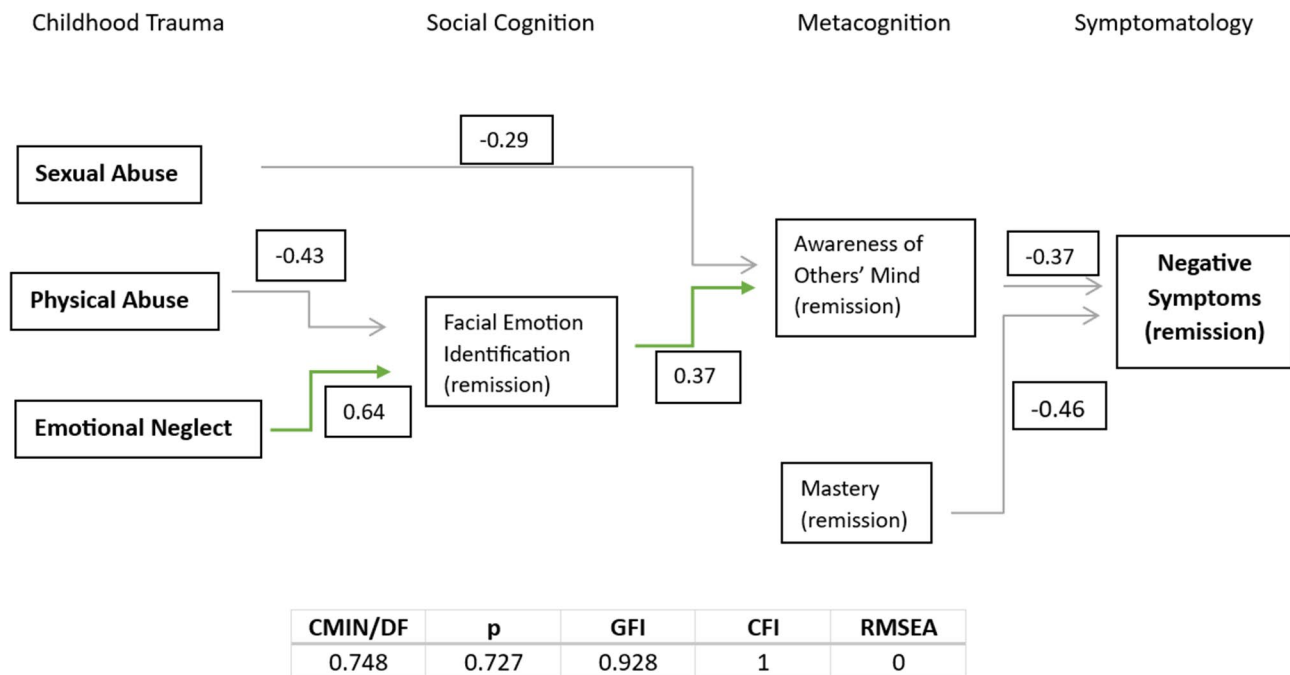
The relationship between childhood trauma, metacognition, social cognition and negative symptoms during remission

Fig. 3 Being exposed to Sexual abuse had a direct negative effect on Awareness of Others' Mind skill during remission in first-episode schizophrenia. While physical abuse negatively effected on Facial Emotion Identification Test, Emotional Neglect positive effected on Facial Emotion Identification Test. In other words, while physical abuse negatively effected, emotional neglect positively effected on emotion perception skills during remission. Physical abuse and emotional neglect had no direct effect on metacognitive skills, but they had an indirect effect on Awareness of Others' Mind by emotion perception skills. Awareness of Others' Mind and Mastery skills negatively effected on negative symptoms, meaning that better metacognitive skills reduced negative symptoms

In remission group baseline self-reflectivity ability is better than non-remission group

First, when the remission and non-remission groups were compared, it was observed that self- reflectivity ability was significantly better in the remission group. This may suggest that self- reflectivity ability is important in symptomatology in long-term follow-up. The inability of a person to understand that one's own mind is different from others and to distinguish between real life and one's own mind may lead to delusions; the inability to establish logical connections between one's own thoughts and behaviors may lead to passivity beliefs; and the inability to initiate appropriate action by being aware of one's own mind may lead to inappropriate behaviors [87]. In addition, since awareness of others' mind ability includes the concept of insight, it may affect insight into the disease [88, 89]. According to Dimaggio et al., knowing one's own mind is also important for understanding others' mind [17]. In addition, studies have shown that metacognitive capacity is linked to symptoms and psychosocial functioning [45] and that having good S skills affects

psychopathology scores and functionality in short and long-term follow-up [22, 90, 91].

Neglect and abuse affect ToM differently

Second, according to the results of hierarchical regression analysis on the effect of CT on social cognition, those with a history of SA during the episode were better at recognizing negative and neutral faces in ToM skills; those with a history of EA were better at recognizing neutral faces, while those with a history of EN had difficulty in recognizing neutral faces. According to the model, being sexually abused positively affected ToM skills during the episode. This finding may be affected by the age, duration and number of trauma exposures, or it may be due to the fact that different types of trauma lead to different outcomes [26]. Myin-Germeys and Van Os have shown that those exposed to abuse are associated with increased stress sensitivity, impaired emotional responses to life stressors and an episodic and positive course, while those exposed to neglect are characterized by more cognitive and negative symptoms and neurodevelopmental

disorders [92]. In our study, in line with the literature, it was observed that particularly EN negatively affected ToM skills (recognition of neutral faces), but that abuse did not have a negative effect on ToM skills. The positive effect of sexual and EA on ToM skills can be considered as a protective adaptation, in fact, those exposed to abuse recognized negative and neutral facial expressions better.

CT affects social cognition differently in episode and remission

It should be emphasized that in this study, ToM skills were only related to CT during the episode, and that CT had no effect on ToM during remission. Vaskinn et al. reported that there was a disease-specific relationship between CT and emotional ToM, but this relationship was not found in healthy controls [27]. Palmier-Claus et al. found no relationship between ToM and CT in high-risk individuals, acute FEP and chronic psychotic patients receiving treatment [30]. The findings of this study, together with the literature, may suggest that CT does not predict ToM skills in long-term follow-up.

Third, we performed hierarchical regression and modeling when examining ER skills. According to these, abuse history facilitates the ER skills during the episode, but has a negative effect on ER skills during remission, while neglect history positively affects ER skills during remission. In similar studies in literature, Aas et al. [93] found that higher CT total scores correlated with stronger brain responses to negative faces. Brañas et al. [94] found that those with a history of CT excluding sexual trauma were more capable of recognizing fear; Bilgi et al. [95] found that those with a history of CT tended to misidentify sad, surprised or angry faces as signs of fear, and that this misidentification was associated with patients' irritability. However, in other studies, Healey and colleagues found that they were unable to recognize most emotions of fear and sadness, while Catalan and colleagues attributed expressions of anger and fear to neutral and happy faces [96, 97]. The different results may be due to methodological differences, age and duration of exposure to trauma, and the fact that the patients in the study samples were exposed to different types of trauma. It is also possible that different traumas may affect ER differently in episode and remission. When evaluated together with literature, examining the effects of CT on different ER skills may increase the results' clarity. Different types of trauma may affect recognizing different faces differently. That different reasons affecting the relationship between CT and ER skills should be investigated with future studies, and that it would be more appropriate to conduct research with a larger sample and a longer follow-up period.

The protective effect of OP-OC in Turkish FES sample

Fifth, an unexpected result was that OP-OC was positively correlated with good metacognitive and social cognitive skills during the episode and remission. This situation was also repeated in regression analysis. The Turkish adaptation of the CTQ scale (CTQ-33) was performed in non-psychotic patients. While OP-OC was perceived as a trauma in non-psychotic Turkish population, OP-OC may have a positive effect in psychotic patients with low premorbid functioning or in need of protection and supervision due to illness and may be perceived as a protective behavior rather than a trauma. Therefore, the OP-OC control items added to the CTQ scale, which is valid and reliable in the non-psychotic population, may have a low predictive power for trauma, at least in FES population, which has lower metacognitive abilities compared to the non-psychotic population. Therefore, the OP-OC items added to the CTQ scale, which is valid and reliable in the non-psychotic population, may have lower predictive power for trauma in FES population with lower metacognitive abilities.

Limitations

There are several limitations to this study. First, the small sample size limits the generalizability of the results; studies with larger samples may address this issue. Secondly, the lack of validity and reliability of the CTQ-33 scale in psychosis group is a methodological limitation. In addition, the fact that this scale is based on patient report may affect the accuracy of reporting trauma. In order to eliminate this bias as much as possible, CTQ-33 was applied when the participants met the remission criteria. Third, since it was thought that CTQ-33 would not provide valid results in non- remission group, these patients were not included in the study. Therefore, the effect of CT and other variables on remission could not be examined. These limitations should be taken into account in interpreting the results of the study.

Conclusion

In this study, the effects of CT in FES patients were examined and the important role of trauma history, especially on negative symptoms, was determined. The findings emphasize the importance of questioning CT history and trauma-oriented interventions in patients diagnosed with psychosis. In addition, it is thought that the use of metacognitive and social cognitive interventions can make positive contributions to the recovery process in cases where drug treatment is insufficient. Therefore, it is recommended that more comprehensive treatment strategies be developed by taking into account the effects of CT in clinical practice. Future studies exploring the effects of different types of trauma on symptomatology, metacognition, and social cognition would be valuable.

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Abbreviations

CT	Childhood Trauma
CTQ-33	Childhood Trauma Questionnaire-33
D	Decentration
DSM-5	Diagnostic and Statistical Manual of Mental Disorders- 5th Edition
EA	Emotional Abuse
EN	Emotional Neglect
FEDT	Facial Emotion Discrimination Test
FEIT	Facial Emotion Identification Test
FEP	First Episode Psychosis
FES	First Episode Schizophrenia
GAS	Global Assessment of Functioning Scale
M	Mastery
MAS-A	Metacognition Assessment Scale- Abbreviated
O	Awareness of Others' Mind
OP-OC	Over Protection-Over Control
PA	Physical Abuse
PANSS	Positive and Negative Syndrome Scale
PN	Physical Neglect
RMET	Reading the Mind in the Eyes Test
RSWG	Remission in Schizophrenia Working Group
S	Self- Reflectivity
SA	Sexual Abuse
SCID-5	Structured Clinical Interview for DSM-5 Disorders
ToM	Theory of Mind

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12888-025-06686-7.

Supplementary Material 1

Data availability
All data generated or analysed during this study are included in this article. Further enquiries can be directed to the corresponding author.

Declarations

Ethical approval and consent to participate
Ethics committee approval was obtained from Ankara City Hospital No. 1 Clinical Research Ethics Committee in accordance with the Declaration of Helsinki, dated 19/10/2022 and numbered E1/2976/2022.

Informed consent
Informed consent form was obtained from all participants.

Consent for publication
All authors gave approval for publication.

Competing interests
The authors declare no competing interests.

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