

Attachment in Schizophrenia: Its Associations with Theory of Mind, Childhood Trauma and Psychosocial Functioning



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ABSTRACT

Objective: Schizophrenia is a chronic psychiatric disorder that arises from the interaction of biopsychosocial factors. Both the disorder itself and psychosocial variables, such as attachment styles and childhood trauma have been associated with impairments in mentalization processes observed in schizophrenia. This study aimed to assess attachment styles in individuals with schizophrenia and explore the associations between insecure attachment, theory of mind, childhood trauma and psychosocial functioning.

Method: The study included 45 patients with schizophrenia and 45 healthy controls. Assessments included the Psychosis Attachment Measure (PAM), Dokuz Eylül Theory of Mind Index (DEZİKÖ), Childhood Trauma Questionnaire (CTQ) and Personal and Social Performance Scale (PSP). Positive and Negative Syndrome Scale (PANSS) and Calgary Depression Scale (CDS) were also administered to patients.

Results: Patients with schizophrenia exhibited significantly higher levels of childhood trauma and insecure attachment alongside impaired theory of mind and poorer psychosocial functioning compared to controls. In the schizophrenia group, insecure attachment correlated with greater symptom severity, higher trauma burden and lower functioning. A moderate negative correlation was found between insecure attachment and theory of mind. However, childhood trauma did not significantly mediate the relationship between insecure attachment and theory of mind performance.

Conclusion: In individuals with schizophrenia, insecure attachment styles are prevalent and are associated with greater symptom severity and poorer psychosocial functioning. Anxious attachment was found to be associated with reduced theory of mind performance; however, no evidence supporting a mediating role of childhood trauma in this relationship was obtained.

Keywords: Attachment, psychosocial functioning, schizophrenia, trauma, theory of mind

INTRODUCTION

Schizophrenia is a complex psychiatric disorder whose precise etiology has not yet been fully elucidated. Although its prevalence shows regional variation, the age-standardized point prevalence of schizophrenia worldwide was estimated to be 0.28% as of 2016. Schizophrenia is projected to account for approximately 13.4 million years lived with disability globally, highlighting its substantial impact on public health (Charlson et al. 2018). The current scientific literature provides substantial evidence that schizophrenia

arises from genetic, neurodevelopmental, and neurocognitive abnormalities (Bonner-Jackson et al. 2010, Rapoport et al. 2012, Trifu et al. 2020). However, these models provide only a limited explanation of the role of psychosocial factors in the development of the disorder. Prenatal stress, childhood trauma, migration, stressful life events, and the urban environment are among the psychosocial factors associated with schizophrenia. Early exposure to some of these factors may contribute to the onset of the disorder, whereas exposure at later stages is associated with symptom exacerbation, treatment resistance, and deterioration in functional outcomes (Lim et al. 2009).

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Several researchers have particularly emphasized the role of early attachment relationships established between the primary caregiver and the child as a central psychosocial factor in the etiology of schizophrenia (Harder 2014). Attachment theory, first proposed by John Bowlby, provides a fundamental perspective that enables the understanding of the origins of both typical psychological maturation and psychopathology. According to Bowlby, emotional attachment, particularly the relationship between an infant and the primary caregiver, functions as an evolutionarily adaptive mechanism that supports survival by maintaining proximity to a protective figure. Beyond this evolutionary function, attachment contributes to the formation of internalized representations, referred to as 'working models' that shape the individual's understanding of the self and others throughout the lifespan (Bowlby 1997). Contemporary neuroscientific research has provided empirical evidence supporting these theoretical constructs. Recent findings in the field of social neuroscience suggest that the mirror neuron system may play a critical role in the development of attachment-related processes. Mirror neurons, which enable the internal simulation of others' actions and emotional states, constitute a potential neural basis for empathy and emotional attunement in the formation of secure attachments (Rizzolatti and Sinigaglia 2016). Studies have shown that early dyadic interactions with caregivers influence the maturation of the mirror neuron system, which in turn shapes the development of mentalization and social cognitive abilities (Luyten et al. 2020). This early relational framework is considered to significantly influence the development of emotion regulation, interpersonal functioning, and psychological resilience, which are frequently impaired in individuals diagnosed with schizophrenia (Mehta et al. 2014). It has been suggested that insecure attachment patterns shaped by early adverse experiences or inconsistent caregiving processes may contribute to increased vulnerability to psychosis by disrupting stress regulation systems and social cognitive processes necessary for adaptive functioning in adulthood (Gumley et al. 2014b, Debbané et al. 2016).

Theory of mind, as one of the various domains of social cognition, is defined as the cognitive capacity to attribute mental states such as beliefs, intentions, desires, and emotions to oneself and to others, thereby enabling the understanding that others may hold thoughts and perspectives different from one's own (Premack and Woodruff 1978). This capacity plays a crucial role in the maintenance of social interactions by facilitating the interpretation and prediction of behaviors in interpersonal contexts. Theory of mind typically begins to develop in early childhood and becomes progressively more refined throughout adolescence (Poulin-Dubois 2020). In this context, it is known that certain brain regions and neural circuits associated with schizophrenia, particularly the prefrontal cortex and the default mode network, also play a

vital role in the maturation of social cognitive abilities (Schurz et al. 2014, Green et al. 2015). Theory of mind impairments have been consistently observed in individuals diagnosed with schizophrenia, in those experiencing a first psychotic episode, in individuals classified as being at ultra-high risk for psychosis, and in unaffected first-degree relatives of patients with schizophrenia (Bora and Pantelis 2013).

There is a close and developmentally interrelated association between attachment and theory of mind (Fonagy and Target 1997). Secure attachment serves as a fundamental basis for the development of a healthy theory of mind. The capacity for mentalization is closely related to the quality of attachment relationships. While secure attachment supports the development of this capacity, anxious or avoidant attachment styles may adversely affect theory of mind performance. Early attachment experiences play a critical role in shaping the neurobiological foundations of social cognition (Szpak and Bialecka-Pikul 2020, Jethava et al. 2022, Gallistl et al. 2024). Several studies have demonstrated that insecure attachment styles exert detrimental effects on theory of mind functioning in individuals with schizophrenia (Pos et al. 2015, Varela et al. 2021). In schizophrenia, childhood traumas, particularly those involving emotional neglect, contribute to impairments in theory of mind (Kincaid et al. 2018). Additionally, adverse childhood experiences have been found to be associated with insecure attachment styles in individuals diagnosed with schizophrenia (Chatziioannidis et al. 2019).

Two landmark studies conducted by the World Health Organization—the International Pilot Study of Schizophrenia (IPSS) (Sartorius et al. 1974, Leff et al. 1992) and the Determinants of Outcome of Severe Mental Disorders (DOSMD) (Jablensky et al. 1992)—were designed to evaluate the long-term outcomes of schizophrenia. A fundamental and consistent finding derived from both studies is that individuals diagnosed with schizophrenia in developing countries tend to experience more favorable outcomes compared to those living in developed countries. This unexpected result paved the way for cross-cultural research and significantly increased interest in the psychosocial dimensions of schizophrenia. Subsequent research in this field can generally be divided into two main categories. The first focuses on structural social adversities such as poverty, discrimination, and social deprivation. These studies have repeatedly demonstrated that ethnic minority groups living in developed countries are at increased risk of developing schizophrenia (Cantor-Graae and Selten 2005, Allardyce and Boydell 2006, Bentall and Fernyhough 2008). Based on these findings, the 'social defeat hypothesis' has been introduced into the literature; this hypothesis proposes that chronic exposure to social disadvantage may function as a causal mechanism leading to psychosis.

The second line of research has focused on childhood trauma and emphasizes the potential of early adverse experiences

to induce both structural and functional changes in the developing brain. (Bendall et al. 2008, İngeç ve Evren Kılıçaslan 2020). When considered alongside the social defeat model, this perspective suggests that schizophrenia outcomes might, contrary to the findings reported in the IPSS and DOSMD studies, actually be expected to be worse in developing countries. Rajkumar, addressing schizophrenia as a multifactorial and complex condition resistant to simple causal explanations, proposed the attachment-developmental-cognitive (ADC) hypothesis. According to this model, early attachment disruptions arising from various forms of adversity may impair neural representations of the self and others, compromise theory of mind abilities, and sensitize the mesolimbic dopamine system involved in the emergence of positive symptoms (Rajkumar 2014).

The primary aim of this study is to examine the relationship between insecure attachment styles and theory of mind performance in individuals diagnosed with schizophrenia. The secondary aims are to evaluate the association of insecure attachment with childhood trauma and psychosocial functioning, and to investigate the potential mediating role of childhood trauma in the relationship between attachment and theory of mind. Additionally, the associations between childhood trauma and theory of mind abilities were explored in both patients with schizophrenia and healthy controls. Accordingly, the hypotheses of the study are as follows: 1) In patients with schizophrenia, the severity of insecure attachment is negatively associated with theory of mind performance. 2) The severity of insecure attachment is associated with greater childhood trauma burden and lower psychosocial functioning. 3) Childhood trauma may mediate the relationship between attachment and theory of mind.

METHODS

Sample

Between May and September 2017, a total of 45 patients aged 20–65 years who presented to the Schizophrenia Outpatient Clinic of the Department of Psychiatry at Dokuz Eylül University and were diagnosed with schizophrenia according to the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV), and 45 healthy controls were included in the study. For the patient group, the exclusion criteria included prior administration of any of the scales used in the present study, a history of electroconvulsive therapy within the past six months, and the presence of any comorbid psychiatric disorder, severe neurological disorder, or medical illness. The patients with schizophrenia included in the study were receiving antipsychotic treatments with different active substances at varying doses. The control group consisted of individuals with no history of any diagnosed psychiatric disorder or use of psychiatric medication.

The study was conducted on a voluntary basis, and written informed consent was obtained from all participants. The study protocol was approved by the Ethics Committee of Dokuz Eylül University (date: 02.03.2017, decision no: 2017/04-13).

Measurement and Assessment Instruments

Sociodemographic Data Form

This form was developed by the researchers to record the sociodemographic characteristics of the participants, such as age, gender, marital status, and educational level.

Structured Clinical Interview for DSM-IV

Axis I Disorders (SCID-I)

The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) was used for diagnostic assessment (First et al. 1997). The Turkish validity and reliability study of the SCID-I was completed in 1999 (Özkürkçügil et al. 1999).

Psychosis Attachment Measure (PAM)

The Psychosis Attachment Measure was adapted from the Experiences in Close Relationships Inventory developed by Brennan and Shaver. The scale consists of 16 items, with 8 items assessing the avoidance dimension of attachment and 8 items assessing the anxiety dimension. Each item describes a specific aspect of the participant's relationship with significant others and is rated on a 4-point Likert-type scale ranging from 0 to 3. The severity of anxious and avoidant attachment is calculated by taking the mean of the item scores corresponding to each attachment dimension. The total score reflects the overall intensity of insecure attachment style (Berry et al. 2006). The Turkish validity and reliability study of the scale has been completed (Burhan et al. 2022).

Dokuz Eylül Theory of Mind Index (DEZİKÖ)

This scale was developed to assess various components of theory of mind, including first and second order false beliefs, irony, metaphor, empathy, and faux pas. The scale consists of seven story-based tasks and five picture-based tasks. In the story tasks, participants are expected to listen to the narrative and respond to a related question. The picture-based tasks consist of three images arranged in a 1–2–3 sequence and depict a brief story. Participants are asked to select the most appropriate fourth picture from two options ("a" and "b") in order to complete the story. Each item is scored as "1" for a correct response and "0" for an incorrect response. The total score obtainable from the scale ranges from 0 to 18 (Değirmencioglu et al. 2018).

Childhood Trauma Questionnaire (CTQ)

This scale was developed by Bernstein and colleagues to retrospectively and quantitatively assess experiences of neglect

and abuse occurring before the age of 20. The scale consists of 28 items and provides five subscale scores assessing childhood sexual, physical, and emotional abuse, as well as emotional and physical neglect. In addition, a total score is calculated from the sum of these subscales (Bernstein et al. 1994). The Turkish validity and reliability study of the scale was completed in 2012 (Şar et al. 2012).

Personal and Social Performance Scale (PSP)

The Personal and Social Performance Scale is a clinician-administered instrument developed to comprehensively assess the individual's level of functioning. The PSP yields a global score ranging from 1 to 100, reflecting personal and social functioning. Scores between 71 and 100 indicate full functioning or only mild functional impairment, scores between 51 and 70 indicate marked or moderate impairment, and scores below 50 indicate severe or very severe functional impairment (Morosini et al. 2000). The Turkish validity and reliability study of the scale was completed in 2009 (Aydemir et al. 2009).

Positive and Negative Syndrome Scale (PANSS)

This semi-structured scale was developed to assess the symptoms and functioning of individuals diagnosed with schizophrenia over the past week. The scale consists of 30 items and includes three subscales evaluating positive symptoms, negative symptoms, and general psychopathology. Each item is rated by the interviewer on a 7-point scale according to the severity of the symptom (Kay et al. 1987). The Turkish validity and reliability study of the scale was completed in 1999 (Kostakoglu et al. 1999).

Calgary Depression Scale (CDS)

This scale was developed to assess depressive symptoms and to measure the severity of depression in individuals diagnosed with schizophrenia. The scale consists of nine items and employs a rating system in which each item is scored between 0 and 3 (Addington et al. 1994). The Turkish validity and reliability study of the scale was conducted in 2000, and the recommended cutoff score was determined to be 11/12 (Aydemir et al. 2000). This scale was used to characterize the clinical profile of the patient group and to ensure that the observed associations could be interpreted independently of prominent depressive symptoms.

Statistical Method

Before initiating the study, a power analysis was performed using G*Power to calculate the sample size. Since the main hypothesis was to examine the relationship between attachment styles and theory of mind in patients with schizophrenia and in the control group, the study conducted by Pos and colleagues was accepted as the reference (Pos et al. 2015). In the results of this study, a moderate correlation

was identified between anxious attachment and theory of mind subscale scores, with a correlation coefficient of -0.45. Therefore, in the power analysis conducted using G*Power, the correlation coefficient was set at $\rho H1=0.45$, α level=0.05, and power=0.80, and the required number of participants for each group was determined to be 36. To account for potential attrition, the sample size was increased by 10%, and it was planned to include a minimum of 40 participants in each group.

The statistical analyses of the study data were performed using IBM Statistical Package for Social Sciences (SPSS) program version 23. The normality of the distributions was assessed for all variables in both the patient and control groups. Continuous variables were expressed as mean and standard deviation, while categorical variables were expressed as frequency and percentage values. In the descriptive analyses, the chi-square test was used for categorical variables, and the Student's t-test was used for the comparison of the means of continuous variables. Correlations between continuous variables were evaluated using Pearson correlation analysis. The relationship between attachment scores and theory of mind in the schizophrenia group was tested using linear regression analysis. In the first model, only these two variables were included, and in the second model, childhood trauma was added to examine changes in the regression coefficients and statistical significance. The 'enter' method was used in the linear regression analysis. A p value of ≤ 0.05 was accepted as the criterion for statistical significance.

RESULTS

A total of 45 patients with schizophrenia and 45 healthy volunteers were included in the study. No significant difference was found between the groups in terms of mean age, gender, education level, and marital status. Detailed sociodemographic information is presented in Table 1.

In patients with schizophrenia, the mean total PANSS score was found to be 57.35 (± 13.58). The mean score of the PANSS positive symptoms subscale was 13.44 (± 4.85), the mean score of the negative symptoms subscale was 15.20 (± 3.82), and the mean score of the general psychopathology subscale was 28.71 (± 7.16). The mean total CDS score was 3.15 (± 3.08). The mean total PSP score was determined to be 93.68 (± 2.52) in healthy controls and 55.11 (± 11.65) in patients with schizophrenia.

Patients with schizophrenia and controls were compared in terms of attachment, childhood trauma, and theory of mind abilities. In patients with schizophrenia, both anxious attachment levels ($p=0.001$) and avoidant attachment levels ($p=0.003$) were found to be significantly higher compared to controls. A statistically significant difference was detected

Table 1. Sociodemographic characteristics of patients and healthy controls

	Patients with schizophrenia	Healthy controls	z / χ^2	p value
Age, mean ($\pm$ SD)	39.62 ($\pm$ 11.13)	35.95 ($\pm$ 11.63)	0.559	0.13 ^a
Gender, n (%)				
Male	28 (62.2%)	26 (57.8%)	0.185	0.415 ^b
Female	17 (37.8%)	19 (42.2%)		
Education level, n (%)				
Primary education	14 (31.1%)	19 (42.2%)	3.930	0.14 ^b
High school	19 (42.2%)	9 (20%)		
University	12 (26.7%)	17 (37.8%)		
Marital status, n (%)				
Single	26 (57.8%)	22 (48.9%)	3.933	0.14 ^b
Married	12 (26.7%)	20 (44.4%)		
Divorced / widowed	7 (15.6%)	3 (6.7%)		

SD: standard deviation; n: sample size; ^a: independent samples t-test; ^b: chi-square test.**Table 2.** Comparison of CTQ, PAM, DEZİKÖ, and PSP scores between patients with schizophrenia and healthy controls

Tests, mean ($\pm$ SD)	Patients with schizophrenia	Healthy controls	p value
PAM-total	21.75 ($\pm$ 7.35)	16.38 ($\pm$ 6.32)	0.001
PAM-anxious	10.33 ($\pm$ 4.92)	6.91 ($\pm$ 4.59)	0.001
PAM-avoidant	12.31 ($\pm$ 4.16)	9.98 ($\pm$ 3.11)	0.003
CTQ-total	54.04 ($\pm$ 7.42)	49.95 ($\pm$ 5.29)	0.003
CTQ-emotional neglect	12.87 ($\pm$ 3.02)	10.82 ($\pm$ 3.83)	0.006
CTQ-emotional abuse	8.47 ($\pm$ 2.86)	6.29 ($\pm$ 1.65)	0.001
CTQ-physical neglect	9.95 ($\pm$ 1.57)	9.69 ($\pm$ 1.62)	0.430
CTQ-physical abuse	6.51 ($\pm$ 2.67)	5.64 ($\pm$ 1.37)	0.056
CTQ-sexual abuse	6.11 ($\pm$ 3.04)	5.53 ($\pm$ 1.39)	0.249
DEZİKÖ-total	13.75 ($\pm$ 2.88)	17.29 ($\pm$ 1.12)	0.001
DEZİKÖ-first order false belief	3.13 ($\pm$ 1.10)	3.87 ($\pm$ 0.34)	0.001
DEZİKÖ-second order false belief	1.22 ($\pm$ 0.97)	2.55 ($\pm$ 0.72)	0.001
DEZİKÖ-irony	2.69 ($\pm$ 0.60)	3.00 ($\pm$ 0.00)	0.001
DEZİKÖ-metaphor	1.27 ($\pm$ 0.72)	1.89 ($\pm$ 0.38)	0.001
DEZİKÖ-empathy	4.55 ($\pm$ 0.87)	4.98 ($\pm$ 0.15)	0.002
DEZİKÖ-faux pas	0.89 ($\pm$ 0.32)	1.00 ($\pm$ 0.00)	0.021
PSP	55.11 ($\pm$ 11.65)	93.68 ($\pm$ 2.52)	<0.001

SD: standard deviation; PAM: psychosis attachment measure; CTQ: childhood trauma questionnaire; DEZİKÖ: Dokuz Eylül theory of mind index; PSP: personal and social performance scale.

between the two groups in terms of total childhood trauma scores ($p=0.003$). In the subtype analyses, emotional abuse ($p=0.001$) and emotional neglect ($p=0.006$) scores were observed to be significantly higher in the schizophrenia group. No significant difference was found between the groups in terms of the other trauma subtypes. In the evaluations related to theory of mind, patients demonstrated lower performance compared to the control group in all subdomains of the DEZİKÖ. Personal and social performance scale scores were also found to be significantly lower in the schizophrenia group compared to controls ($p < 0.001$). Detailed results regarding PAM, CTQ, DEZİKÖ, and PSP are presented in Table 2.

In patients with schizophrenia, total PAM scores were found to show positive and moderate correlations with the total PANSS score as well as with the positive symptoms and general psychopathology subscale scores. Moderate relationships were detected between anxious attachment and all PANSS scores. Similarly, avoidant attachment showed positive and moderate correlations with the total PANSS score, the positive symptoms score, and the general psychopathology score. In patients with schizophrenia, a moderate negative correlation was found between total PAM scores and PSP scores. Both anxious and avoidant attachment were found to be negatively associated with functioning.

Table 3. Correlation analysis of PAM Scores with PANSS, PSP, CTQ, and DEZİKÖ scores in patients with schizophrenia

Testler	PAM-total r	PAM-anxious r	PAM-avoidant r
PANSS-total	0.452**	0.416**	0.378**
PANSS-positive	0.414**	0.365**	0.371**
PANSS-negative	0.240	0.327*	0.097
PANSS-general psychopathology	0.447**	0.364**	0.413**
CTQ-total	0.302*	0.239	0.344**
CTQ-emotional neglect	0.241	0.245	0.273*
CTQ-emotional abuse	0.539**	0.447**	0.521**
CTQ-physical neglect	0.080	0.108	0.110
CTQ-physical abuse	0.351**	0.260*	0.378**
CTQ-sexual abuse	-0.227	-0.249*	-0.145
DEZİKÖ-total	-0.270*	-0.300*	-0.204
DEZİKÖ-first order false belief	-0.108	-0.156	-0.104
DEZİKÖ-second order false belief	-0.259*	-0.191	-0.208
DEZİKÖ-irony	-0.090	-0.057	-0.107
DEZİKÖ-metaphor	-0.284*	-0.315*	-0.195
DEZİKÖ-empathy	-0.124	-0.204	-0.043
DEZİKÖ-faux pas	-0.129	-0.223	-0.094
PSP	-0.420**	-0.357**	-0.427**

*: p value ≤ 0.05 ; **: p value ≤ 0.01 ; r: correlation coefficient; PAM: psychosis attachment measure; PANSS: positive and negative syndrome scale; CTQ: childhood trauma questionnaire; DEZİKÖ: Dokuz Eylül theory of mind index; PSP: personal and social performance scale.

In the schizophrenia group, total PAM scores were found to show positive and moderate correlations with the total CTQ score as well as with the emotional abuse subscale score. In addition, among the trauma subtypes, the strongest association of total PAM scores was determined to be with emotional abuse. Anxious attachment was positively associated with emotional and physical abuse, whereas it showed a weak and negative association with sexual abuse. Avoidant attachment showed a moderate positive correlation with the total CTQ score, a weak positive correlation with emotional neglect, a strong positive correlation with emotional abuse, and a moderate positive correlation with physical abuse.

In patients with schizophrenia, total PAM scores were found to show negative and weak correlations with the total DEZİKÖ score as well as with the second order false belief and metaphor subscale scores. Anxious attachment was found to be negatively and moderately associated with both the total DEZİKÖ score and the metaphor subscale. No significant relationship was observed between avoidant attachment and the theory of mind subscales. Detailed results of the correlation analyses conducted in the schizophrenia group are presented in Table 3.

No statistically significant correlation was detected between the CTQ-total score and any DEZİKÖ subscale in patients with schizophrenia. However, CTQ-emotional neglect and

CTQ-physical neglect scores showed negative and moderate correlations with the DEZİKÖ-metaphor ($p=0.002$, $p=0.001$) and DEZİKÖ-faux pas ($p=0.002$, $p=0.001$) subscales. In addition, CTQ-physical abuse scores showed a weak negative correlation with the DEZİKÖ-irony subscale ($p=0.047$) and moderate negative correlations with the DEZİKÖ-metaphor ($p=0.025$) and DEZİKÖ-faux pas ($p=0.025$) subscales. In the healthy control group, a moderate negative correlation was found between the CTQ-total score and both the DEZİKÖ-total score ($p=0.006$) and the DEZİKÖ-second order false belief subscale ($p=0.008$). In addition, CTQ-physical neglect scores showed a negative and moderate correlation with the DEZİKÖ-empathy subscale ($p=0.037$). Detailed results of the correlation analyses regarding CTQ and DEZİKÖ scores for both patients with schizophrenia and healthy controls are presented in Table 4.

In healthy controls, no statistically significant correlation was detected between PAM scores and CTQ, DEZİKÖ, or PSP scores. A detailed presentation of the correlation analysis results for the control group is provided in Table 5.

A hierarchical linear regression analysis was conducted in the schizophrenia group to examine whether anxious attachment and childhood trauma predicted theory of mind performance. In the first model, anxious attachment (PAM-anxious) significantly predicted DEZİKÖ-total scores, with $\beta=-0.30$, t

Table 4. Correlation analysis between CTQ scores and DEZİKÖ scores in patients with schizophrenia and healthy controls

Tests, r	DEZİKÖ-total	DEZİKÖ-first order false belief	DEZİKÖ-second order false belief	DEZİKÖ-irony	DEZİKÖ-metaphor	DEZİKÖ-empathy	DEZİKÖ-faux pas
Schizophrenia group							
CTQ-total	-0.171	-0.157	-0.052	-0.202	-0.239	-0.067	-0.239
CTQ-emotional neglect	-0.186	-0.118	-0.005	-0.276	-0.442**	-0.040	-0.442**
CTQ-emotional abuse	-0.148	-0.237	-0.111	-0.113	-0.033	-0.024	0.033
CTQ-physical neglect	-0.204	-0.181	-0.038	-0.137	-0.467**	-0.115	-0.467**
CTQ-physical abuse	-0.175	-0.093	-0.034	-0.298**	-0.334*	-0.184	-0.334*
CTQ-sexual abuse	0.081	0.029	-0.085	-0.183	0.131	0.088	0.131
Healthy controls							
CTQ-total	-0.400**	-0.203	-0.390**	a	a	-0.088	a
CTQ-emotional neglect	-0.385**	-0.329*	-0.291	a	a	-0.007	a
CTQ-emotional abuse	-0.169	0.029	-0.290	a	a	0.119	a
CTQ-physical neglect	-0.200	-0.076	-0.159	a	a	-0.311*	a
CTQ-physical abuse	-0.258	-0.200	-0.209	a	a	-0.040	a
CTQ-sexual abuse	-0.291	-0.181	-0.278	a	a	0.058	a

*: p value ≤ 0.05 ; **: p value ≤ 0.01 ; r: correlation coefficient; CTQ: childhood trauma questionnaire; DEZİKÖ: Dokuz Eylül theory of mind index; a: not computed because at least one of the variables is constant.

Table 5. Correlation analysis of PAM scores with PSP, CTQ, and DEZİKÖ scores in healthy controls

Tests	PAM-total r	PAM- anxious r	PAM-avoidant r
PSP	0.036	0.045	0.008
CTQ-total	0.161	0.143	0.174
CTQ-emotional neglect	0.008	0.106	-0.029
CTQ-emotional abuse	0.173	0.088	0.174
CTQ-physical neglect	0.227	0.179	0.210
CTQ-physical abuse	0.079	0.042	0.099
CTQ-sexual abuse	-0.021	-0.028	0.055
DEZİKÖ-total	0.167	0.040	0.275
DEZİKÖ-first order false belief	0.118	-0.008	0.188
DEZİKÖ-second order false belief	0.157	0.118	0.227
DEZİKÖ-irony	a	a	a
DEZİKÖ-metaphor	a	a	a
DEZİKÖ-empathy	-0.184	-0.235	-0.099
DEZİKÖ-faux pas	a	a	a

r: correlation coefficient; a: not computed because at least one of the variables is constant; PAM: psychosis attachment measure; PSP: personal and social performance scale; CTQ: childhood trauma questionnaire; DEZİKÖ: Dokuz Eylül theory of mind index.

(43)=-2.06, $p=0.045$, and explained approximately 9% of the variance in theory of mind ($R^2=0.090$, $F(1,43)=4.26$, $p=0.045$). In the second model, childhood trauma (CTQ-total) was added to the model to evaluate its incremental contribution. However, the overall model was not found to be statistically significant, $F(2,42)=2.35$, $p=0.108$, and neither anxious attachment

($p=0.075$) nor childhood trauma ($p=0.486$) significantly predicted DEZİKÖ scores. Although a slight increase in the explained variance was observed ($R^2=0.101$), the inclusion of CTQ did not make a significant contribution to the model. The results of the linear regression analysis conducted in the schizophrenia group are presented in Table 6.

Table 6. Results of the regression analysis on the effects of attachment and trauma on theory of mind in patients with schizophrenia

Model	Predictor	B	SE	β	t	p	R ²	F (df)	Model p
1	Constant	15.575	0.975	-	15.978	0.000	0.090	4.255 (1.43)	0.045
	PAM-anxious	-0.176	0.085	-0.300	-2.063	0.045			
2	Constant	17.645	3.107	-	5.680	0.000	0.101	2.349 (2.42)	0.108
	PAM-anxious	-0.161	0.088	-0.275	-1.824	0.075			
	CTQ-total	-0.041	0.059	-0.106	-0.702				

PAM: psychosis attachment measure; CTQ: childhood trauma questionnaire.

DISCUSSION

The attachment perspective provides a critical understanding of the unique nature of the early bond established between the caregiver and the infant during the early years of life. Attachment theory proposes that the human need for close interpersonal bonds is grounded in an evolutionary basis and argues that these bonds enhance survival by maintaining physical proximity to the caregiver while also supporting the infant's cognitive and socio-emotional development. This attachment pattern formed in early life tends to continue throughout the lifespan with relative stability (Bowlby 1997). Empirical studies suggest that adult attachment can best be understood along two fundamental relational dimensions: attachment anxiety and attachment avoidance. When conceptualized categorically, the combination of these two dimensions yields four prototypical adult attachment styles: secure (low anxiety, low avoidance), preoccupied/anxious (high anxiety, low avoidance), dismissing/avoidant (low anxiety, high avoidance), and fearful (high anxiety, high avoidance) (Bartholomew and Horowitz 1991). Attachment provides a promising framework for understanding the psychosocial mechanisms underlying the development, prevention, and treatment of schizophrenia. Dismissing/avoidant attachment has been reported as the most prevalent attachment style among individuals with psychosis, with observed rates ranging from 48% to 71%. This rate has been reported to be approximately 27% in the general population. In psychosis samples, the prevalence of preoccupied/anxious attachment ranges between 12% and 20%, whereas secure attachment is observed at rates of approximately 27% to 32%. In contrast, normative samples demonstrate lower rates of preoccupied/anxious attachment (19%) and significantly higher rates of secure attachment (58%) (Gumley et al. 2014a, Harder 2014). In a recent meta-analysis examining psychosis and attachment styles, insecure attachment was reported to be present in 76% of individuals with psychosis and in 38% of normative samples. Among individuals with psychosis, the most prevalent attachment style was fearful attachment, observed at a rate of 38%. In addition, dismissing/avoidant attachment was found at a rate of 23%, and preoccupied/anxious attachment at a rate of 17% (Carr et al. 2018). Consistent with previous findings, our study demonstrated

that individuals diagnosed with schizophrenia exhibited significantly higher levels of both attachment anxiety and attachment avoidance, which are considered indicators of insecure attachment, compared to healthy controls.

To date, studies examining the relationship between attachment patterns and psychosis symptom profiles or illness severity have yielded inconsistent findings (Korver-Nieberg et al. 2014). However, recent systematic reviews examining the link between attachment and psychotic disorders have reported robust evidence that a dismissing/avoidant attachment style is associated with positive symptoms and to a lesser extent with negative symptoms (Gumley et al. 2014a, Korver-Nieberg et al. 2014). In addition, there is some evidence indicating that the preoccupied/anxious attachment style is associated with positive and affective symptoms, but not with negative symptoms (Harder 2014). A meta-analysis conducted in 2018 demonstrated that the severity of positive symptoms in psychosis was associated with both anxious and avoidant attachment styles; however, similar associations were not observed for negative symptoms (Carr et al. 2018). Consistent with these findings, our results also demonstrated that, in the schizophrenia group, the severity of anxious attachment was positively correlated with all PANSS scores. Furthermore, the overall severity of insecure attachment and the severity of avoidant attachment showed positive correlations with all PANSS subscales except for negative symptoms. These findings support the notion of a positive association between the severity of insecure attachment and overall illness severity in schizophrenia. In individuals with psychotic disorders, the presence of an insecure attachment style has been reported to be associated with earlier onset of illness, poorer clinical outcomes and lower functioning (Carr et al. 2018). Attachment plays a direct role in influencing an individual's likelihood of engaging in treatment. Attachment anxiety has been associated with excessively demanding behavior, whereas attachment avoidance has been linked to interpersonal hostility (Berry et al. 2008). Increased levels of insecure attachment are associated with a higher likelihood of disengagement from mental health services. In particular, avoidant attachment has been associated with reduced help-seeking behavior, limited benefit from treatment, and a weaker therapeutic alliance (Gumley et al. 2014a, Harder 2014).

In our study, the negative correlations observed between functioning scale scores and both anxious and avoidant attachment styles are consistent with findings reported in the existing literature. These results indicate that insecure attachment patterns may play a critical role as vulnerability factors in the onset or persistence of psychotic disorders.

Studies addressing attachment patterns, early childhood trauma, and theory of mind together in schizophrenia are limited, and these variables have mostly been examined at the level of bivariate associations. Existing findings suggest that insecure attachment and a higher trauma burden may be associated with impairments in theory of mind performance (Pos et al. 2015, Chatziioannidis et al. 2019). Although studies examining the relationship between childhood trauma and psychosis have reported varying prevalence rates, findings consistently indicate that adverse childhood experiences significantly increase the risk of developing psychosis. One of the most comprehensive meta-analyses conducted to date demonstrated that childhood trauma increases the likelihood of psychosis by approximately threefold. Among trauma types, emotional abuse was identified as having the strongest effect in increasing the risk of psychosis (Zhou et al. 2025). In our study, the total childhood trauma scores of patients with schizophrenia were found to be significantly higher compared to healthy controls. Subscale analyses revealed that emotional neglect and emotional abuse scores were markedly elevated in the schizophrenia group. However, findings from studies examining the relationship between attachment style and childhood experiences in individuals with psychosis are not conclusive. In a study conducted in 2004, an association between childhood trauma and attachment avoidance was reported in individuals with psychosis (Tait et al. 2004), whereas a study conducted in 2009 identified an association only between childhood trauma and attachment anxiety. Notably, when depression and other relevant factors were controlled for, the association between childhood trauma and attachment anxiety was no longer found to be significant (Berry et al. 2009). Consistent with the findings of Tait and colleagues, our study also identified a positive correlation in the schizophrenia group between childhood trauma and both the overall severity of insecure attachment and avoidant attachment; however, a similar association was not observed for anxious attachment.

Impairment in the capacity of patients with schizophrenia to evaluate and predict both their own mental states and those of others is a well-documented cognitive deficit and may explain certain aspects of their social dysfunction. Numerous studies aiming to evaluate the role of social cognition and mentalization in schizophrenia have primarily focused on theory of mind. Although some findings suggest that theory of mind impairments become more pronounced during acute phases of the illness, the overall evidence indicates that

such impairments constitute a stable trait of schizophrenia (Sprong et al. 2007, Dimopoulou et al. 2017). In our study, patients with schizophrenia exhibited impairments in all domains of theory of mind compared to healthy controls. It has been suggested that attachment style may be associated with cognitive and social outcomes in psychotic disorders. In this context, a study conducted in 2015 on individuals diagnosed with psychotic disorders found a U-shaped relationship between avoidant attachment and theory of mind, demonstrating that low and high levels of avoidant attachment were associated with better theory of mind performance compared to moderate levels. In the same study, anxious attachment was reported to be associated with more pronounced impairments in theory of mind abilities (Pos et al. 2015). A study conducted in 2021 demonstrated a positive association between avoidant attachment and theory of mind in individuals with schizophrenia spectrum disorders (Pena-Garijo and Monfort-Escrig 2021). Considering the findings of both studies, it has been suggested that high levels of avoidant attachment may exert a protective effect on theory of mind functioning in individuals with psychosis. In our study, total theory of mind scores in patients with schizophrenia were negatively correlated with both the total insecure attachment score and anxious attachment scores. However, no significant association was detected between theory of mind and avoidant attachment. This finding suggests that avoidant attachment may have a potential protective effect on theory of mind functioning.

Differential effects of childhood trauma on patients with schizophrenia and healthy controls have previously been reported. A functional neuroimaging study suggested that childhood trauma may trigger developmentally adaptive neural responses in healthy individuals, whereas it may exert adverse effects on theory of mind functioning in schizophrenia (Vai et al. 2024). However, contrary to previous findings, no significant association was detected between the CTQ total score and the DEZİKÖ total score in the schizophrenia group in our study. In contrast, a significant negative correlation was found between these variables in the control group. Further analyses based on trauma subtypes revealed that emotional neglect, physical neglect, and physical abuse in patients with schizophrenia were associated with lower performance on DEZİKÖ subscales that predominantly assess the affective components of theory of mind (irony and faux pas). However, in the control group, impairments were observed in subscales such as second order false belief, which more strongly reflect the cognitive aspects of theory of mind. Although these findings may initially appear inconsistent with the previous literature, they in fact reinforce the view that childhood trauma may affect theory of mind abilities through different mechanisms in schizophrenia and in healthy controls.

This study aimed to understand the role of early relational experiences in theory of mind in schizophrenia emerging on a background of neurodevelopmental vulnerability. When considered within the framework of the social defeat hypothesis, the findings of the study suggest that the association between insecure attachment and impairments in theory of mind may be related not only to early individual experiences but also to lifelong processes of social exclusion and disadvantage. In our study, the absence of a mediating role of childhood trauma in the relationship between attachment and theory of mind may reflect that this association is shaped not by a singular early trauma burden but rather by more persistent and contextual social experiences. From this perspective, insecure attachment patterns may create increased vulnerability in social interactions, and the accompanying experiences of social defeat may deepen impairments in social cognitive functioning over time. However, since social defeat was not directly measured in this study, this interpretation should be considered at a theoretical level.

In many studies conducted to date, patient samples have been selected to encompass the entire spectrum of psychotic disorders. Although this approach broadens the scope of analysis, it leads to considerable variability in the findings and may compromise the generalizability of the results. In order to reduce diagnostic heterogeneity and increase internal validity, the present study focused exclusively on individuals with a confirmed diagnosis of schizophrenia. Moreover, previous research has demonstrated considerable variability in the measurement instruments used to assess attachment in psychotic populations. One of the major strengths of this study is the use of an attachment scale specifically developed and validated for individuals with psychosis. The assessment of theory of mind performance using a multidimensional measurement tool enabled the identification of the differential effects of childhood trauma on distinct components of theory of mind. The consistent demonstration of theory of mind impairments in predominantly male schizophrenia samples in previous studies may be considered a replication of existing findings; however, the unique contribution of this study lies not only in describing these impairments but also in addressing their relational context with attachment patterns and psychosocial functioning in a comprehensive manner. In particular, the finding that anxious attachment was associated with theory of mind performance and that childhood trauma did not support a mediating role in this relationship suggests that social cognitive impairments in schizophrenia cannot be explained solely by trauma burden. In this respect, the study indicates that attachment-based developmental mechanisms may play a more central role in understanding social cognitive functioning in schizophrenia. Furthermore, as one of the limited number of studies conducted in a Turkish sample, this research contributes to understanding the potential effects

of cultural characteristics on attachment patterns and social cognitive functioning.

This study has several limitations that should be taken into consideration. Important psychosocial factors such as migration history, socioeconomic status, and substance use were not included in the analyses. Chlorpromazine equivalent dose information was not available for patients with schizophrenia who were receiving antipsychotics with different active substances at varying doses. Therefore, data related to antipsychotic use could not be included in the analyses. In addition, illness-related variables such as age of onset, duration of illness, and treatment adherence were not systematically evaluated. Neurodevelopmental factors involved in the etiology of schizophrenia were not directly addressed. However, this reflects the deliberate focus of the study on examining the role of early relational experiences in theory of mind within schizophrenia developing on a background of neurodevelopmental vulnerability. Although an attachment scale specifically developed for psychosis was used, the self-report nature of the scale may limit the reliability of the findings due to potential response biases. There was a marked gender imbalance in the sample consisting of patients with schizophrenia, with the number of male participants being approximately twice that of female participants. This disproportionate distribution may have influenced the reporting rates of certain childhood traumas, particularly sexual abuse. In addition, the cross-sectional design of the study does not allow for causal inferences and requires cautious interpretation regarding the direction of the relationships among attachment patterns, childhood trauma, and theory of mind functioning.

Schizophrenia represents a heterogeneous psychiatric disorder whose etiology remains complex and uncertain despite extensive research. Although new pharmacological treatments for schizophrenia have been developed, many patients continue to show limited treatment response, demonstrate poor treatment adherence, and experience persistently low levels of psychosocial functioning. From this perspective, investigating psychosocial factors in schizophrenia holds substantial importance for identifying at-risk populations, predicting the course of the illness and enhancing both treatment adherence and functional outcomes. To better elucidate causal relationships among attachment, trauma, theory of mind, and functioning in schizophrenia, future studies with larger sample sizes and longitudinal designs are warranted. Data derived from such methodologically rigorous studies may contribute to a more nuanced understanding of the developmental and cognitive foundations of the disorder. Moreover, this knowledge may facilitate the integration of targeted psychosocial interventions into clinical practice, which currently focuses largely on pharmacological approaches. Enhancing our conceptual and therapeutic

framework in this manner may ultimately improve treatment adherence, functional recovery, and long-term outcomes in individuals living with schizophrenia.

Ethics Committee Approval: The study protocol was approved by the Dokuz Eylül University Ethics Committee on 02.03.2017, with decision number 2017/04-13.

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