



RESEARCH ARTICLE

Personal and social functioning, formal thought disorder, and executive functioning in violent offenders with schizophrenia: A cross-sectional study

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ABSTRACT

Objective: Functional impairment is a major determinant of long-term outcomes in schizophrenia and is influenced by multiple clinical and cognitive factors. Although formal thought disorder (FTD) has been associated with adverse outcomes, its relationship with functioning in patients with schizophrenia and a history of violent offending remains unclear. This study investigated the relationships among FTD, executive functioning, and personal and social functioning in this population.

Method: This cross-sectional study included 64 inpatients with schizophrenia and a history of violent offending. Psychopathology was assessed using the Positive and Negative Syndrome Scale (PANSS), depressive symptoms using the Calgary Depression Scale for Schizophrenia (CDSS), formal thought disorder using the Thought and Language Disorder Scale (TALD), executive functioning using the Frontal Assessment Battery (FAB), and personal and social functioning using the Personal and Social Performance Scale (PSP). Spearman correlation and multiple linear regression analyses were performed to identify factors associated with functioning.

Results: Poorer functioning was associated with greater psychopathology and more severe FTD. Subjective negative thought disorder showed the strongest associations with poorer functioning, including socially useful activities, interpersonal relationships, and self-care (all $p < 0.01$). Executive functioning, particularly verbal fluency, was positively associated with functioning; however, subjective negative thought disorder remained the only independent predictor of PSP total scores ($\beta = -0.324$, $p = 0.032$).

Conclusion: Formal thought disorder, particularly its subjective negative dimension, appears to be an important determinant of personal and social functioning in patients with schizophrenia and a history of violent offending. These findings highlight the importance of assessing thought disorder beyond overall symptom severity and suggest that interventions targeting communication and thought organization may support functional recovery in forensic schizophrenia populations.

Keywords: Schizophrenia, executive function, social adjustment, violence, aggression

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INTRODUCTION

Schizophrenia is a chronic and clinically heterogeneous psychiatric disorder characterized by disturbances in perception, thought processes, affect regulation, and behavior. In addition to positive symptoms such as delusions and hallucinations, individuals frequently experience negative symptoms and persistent cognitive impairments that significantly affect social, occupational, and interpersonal functioning throughout the course of illness (1, 2). Functional impairment is increasingly recognized as one of the most important determinants of long-term outcomes in schizophrenia and is conceptualized as a multidimensional construct shaped not only by psychotic symptoms but also by deficits in cognition, motivation, communication, and social adaptation (3). Despite advances in pharmacological treatment, functional recovery remains limited for many patients, highlighting the need to identify clinical and cognitive factors associated with real-world functioning.

Although most individuals with schizophrenia are not violent, epidemiological studies have consistently reported a modest but reliable increase in the risk of violent behavior compared with the general population (4, 5). Violent offending in schizophrenia is thought to arise from the interaction of multiple vulnerability factors, including substance use, treatment nonadherence, previous violence, social disadvantage, and symptom-related factors (6–8). Patients with a history of violent offending may experience greater clinical complexity and poorer psychosocial outcomes, making this subgroup particularly relevant for studies investigating factors associated with functional outcomes.

Cognitive dysfunction is increasingly regarded as a core feature of schizophrenia and a major contributor to poor functional outcome. Deficits in executive functioning, cognitive flexibility, working memory, inhibitory control, and social cognition often persist beyond acute psychotic episodes and are closely associated with impaired community functioning (1, 9). Executive dysfunction may compromise an individual's ability to regulate behavior, accurately interpret environmental cues, solve interpersonal problems, and engage effectively in daily activities. Previous studies have reported mixed findings regarding executive functioning in patients with schizophrenia and a history of violent offending. While some studies have identified greater executive dysfunction and poorer decision-making

abilities in violent offenders, others have found no significant differences or even better performance in specific cognitive domains. Nevertheless, executive functioning remains an important construct to investigate because impairments in executive processes may contribute to behavioral regulation, social adaptation, and functional outcomes in schizophrenia (5, 10–14).

Formal thought disorder (FTD) is another central feature of schizophrenia and refers to disturbances in the organization, structure, and expression of thought. Clinically, FTD may manifest as derailment, tangentiality, incoherence, perseveration, poverty of speech, or subjective experiences of thought interference and fragmentation (15). Contemporary dimensional models distinguish between objective and subjective manifestations of thought disorder, as well as positive and negative dimensions, which may reflect partially distinct neurocognitive mechanisms (16). Beyond its diagnostic significance, FTD has been associated with impaired communication, reduced social competence, poorer functional outcomes, and deficits in executive control and semantic processing (17). Although recent studies have highlighted the contribution of specific dimensions of FTD to violent offending in schizophrenia (18), considerably less is known about how these dimensions relate to personal and social functioning in patients with schizophrenia and a history of violent offending. Consequently, it remains unclear whether thought disorder is associated with functional impairment independently of symptom severity and executive dysfunction.

Emerging evidence suggests that disturbances in thought organization may be particularly relevant in forensic schizophrenia populations. Difficulties in maintaining coherent thought processes and accurately interpreting interpersonal situations may contribute not only to maladaptive behavioral responses but also to reduced social and occupational functioning (19, 20). Nevertheless, the relationships among FTD, executive functioning, and functional outcomes remain insufficiently explored. Existing studies are limited by methodological heterogeneity, small forensic samples, and a tendency to examine cognition and thought disorder separately rather than within an integrated framework. Furthermore, few studies have simultaneously investigated executive functioning, FTD, and personal and social functioning within the same sample of patients with schizophrenia and a history of violent offending. A better understanding of these relationships may

inform individualized rehabilitation strategies and improve the assessment of factors associated with functional recovery in forensic psychiatric settings.

Accordingly, the present study aimed to investigate the relationships among FTD, executive functioning, and personal and social functioning in patients with schizophrenia and a history of violent offending and to identify factors independently associated with functional outcomes within this forensic sample. We hypothesized that greater FTD severity and poorer executive functioning would be associated with lower levels of personal and social functioning.

METHODS

Participants

This cross-sectional study included 64 inpatients diagnosed with schizophrenia according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria. All participants were recruited from the High-Security Forensic Psychiatry Unit of Ankara Bilkent City Hospital between August 2024 and January 2025. The sample consisted exclusively of patients with a documented history of violent offending.

No a priori power analysis was performed because the study included a consecutive sample of all eligible patients admitted to the High-Security Forensic Psychiatry Unit during the predefined study period. Therefore, the sample size was determined by the number of patients meeting the inclusion criteria rather than by a predefined statistical calculation.

Violent offending was defined as a legally documented act involving physical harm or the threat of physical harm to another person or property, confirmed through judicial records and forensic clinical files. Eligible participants were 18–55 years of age, had sufficient literacy and cognitive capacity to complete the clinical interviews and psychometric assessments, demonstrated adequate cooperation throughout the assessment process, and provided written informed consent before participation. Exclusion criteria included intellectual disability, dementia or other neurological disorders, acute substance intoxication at the time of assessment, illiteracy, and receipt of electroconvulsive therapy during the study period. Acute substance intoxication was excluded based on clinical evaluation and negative urine toxicology screening performed at hospital admission. Clinically evident intellectual disability was excluded based on clinical evaluation and review of medical records rather than standardized psychometric testing.

All evaluations were conducted face-to-face by clinicians experienced in forensic psychiatry while participants were in a clinically stable phase, defined as the absence of acute psychotic exacerbation requiring immediate treatment modification and the presence of adequate cooperation during clinical interviews and psychometric assessments.

Clinical and Cognitive Assessment

Sociodemographic and clinical characteristics, including illness duration, treatment history, substance use, and forensic history, were obtained from medical records and structured clinical interviews using a standardized data collection form.

Psychotic symptom severity was assessed using the Positive and Negative Syndrome Scale (PANSS) (21), which evaluates positive symptoms (seven items), negative symptoms (seven items), and general psychopathology (16 items). The PANSS comprises 30 items rated from 1 to 7, with total scores ranging from 30 to 210; higher scores indicate greater symptom severity. The Turkish validity and reliability study was conducted by Kostakoğlu et al. (22).

Depressive symptoms were evaluated using the Calgary Depression Scale for Schizophrenia (CDSS), a clinician-rated instrument specifically developed to assess depressive symptoms in schizophrenia while minimizing overlap with negative and extrapyramidal symptoms (23). The CDSS comprises nine items scored from 0 to 3, with total scores ranging from 0 to 27; higher scores indicate greater depressive symptom severity. The Turkish validity and reliability study was conducted by Aydemir et al. (24).

Personal and social functioning was assessed using the Personal and Social Performance Scale (PSP), which provides a total score ranging from 1 to 100 and evaluates functioning across four domains: socially useful activities, personal and social relationships, self-care, and disturbing or aggressive behaviors. Higher total scores indicate better overall functioning (25, 26).

Formal thought disorder was evaluated using the Thought and Language Disorder Scale (TALD), a 30-item, semistructured, clinician-rated instrument in which each item is scored from 0 (absent) to 4 (severe), yielding a total score ranging from 0 to 120. The TALD assesses four dimensions of formal thought disorder: objective positive, objective negative, subjective positive, and subjective negative. Objective dimensions are based on the clinician's observations of speech and language abnormalities, whereas subjective dimensions reflect the patient's self-

reported experiences of disturbed thinking. Positive dimensions reflect disorganization and productive thought abnormalities, whereas negative dimensions reflect impoverishment and reduction of thought and language (27). The Turkish validity and reliability study was conducted by Mutlu et al. (28).

Executive functioning was assessed using the Frontal Assessment Battery (FAB) (29), which comprises six subtests assessing conceptualization, mental flexibility, motor programming, sensitivity to interference, inhibitory control, and environmental autonomy. Total FAB scores range from 0 to 18, with higher scores indicating better executive functioning. The Turkish validity and reliability study was conducted by Tunçay (30).

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Ankara Bilkent City Hospital (August 7, 2024; approval number: 1-24-470).

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables are presented as mean $\pm$ standard deviation (SD), whereas categorical variables are presented as frequencies and percentages. Sex-stratified comparisons of continuous variables were performed using independent-samples *t* tests.

Normality assumptions were evaluated using the Shapiro–Wilk test together with skewness and kurtosis values. Because several clinical variables showed non-normal distributions, associations between functioning measures and clinical variables were examined using Spearman rank correlation coefficients.

Correlation analyses were performed to investigate the relationships between PSP total and subscale scores and measures of psychopathology (PANSS and CDSS), formal thought disorder (TALD), and executive functioning (FAB).

To identify factors independently associated with personal and social functioning, a multiple linear regression analysis was conducted with the PSP total score as the dependent variable. Variables were selected for inclusion in the regression model based on their bivariate associations with PSP total scores and clinical relevance. Among the TALD dimensions, subjective negative thought disorder was selected because it showed the strongest association with overall functioning. To minimize multicollinearity, PANSS positive and general psychopathology scores were excluded because of high variance inflation factor (VIF) values; PANSS negative symptoms were

Table 1: Sociodemographic and clinical characteristics of the participants

	Patients (n=64)
Age (years)	40.39 $\pm$ 10.07
Male sex, n (%)	47 (73.4)
Education (years)	10.31 $\pm$ 4.08
Smoking duration (years)	13.20 $\pm$ 11.97
Alcohol use duration (years)	0.75 $\pm$ 3.75
Substance use duration (years)	0.23 $\pm$ 1.88
Age at symptom onset (years)	24.66 $\pm$ 8.67
Age at first psychiatric admission (years)	26.19 $\pm$ 8.55
Duration of illness (years)	14.3 $\pm$ 9.2
Duration of antipsychotic treatment (years)	7.42 $\pm$ 6.20
Duration of untreated psychosis (years)	6.91 $\pm$ 8.80
Number of hospitalizations	2.36 $\pm$ 2.06
Antipsychotic dose (chlorpromazine equivalent, mg)	602.28 $\pm$ 375.43
Antipsychotic dose (risperidone equivalent, mg)	9.03 $\pm$ 5.64
Body mass index (BMI)	27.68 $\pm$ 5.64

Values are presented as mean $\pm$ standard deviation unless otherwise indicated. BMI: Body mass index.

therefore included as the psychopathology measure. The FAB total score was included as the measure of executive functioning. Standardized beta coefficients (β), model fit statistics, and explained variance (R^2) were reported. Statistical significance was set at $p < 0.05$ (two-tailed).

RESULTS

The sociodemographic and clinical characteristics of the study sample are presented in Table 1. The sample consisted predominantly of male patients (73.4%), with a mean age of 40.39 $\pm$ 10.07 years. The mean duration of illness was 14.3 $\pm$ 9.2 years, and the mean duration of untreated psychosis was 6.91 $\pm$ 8.80 years. Participants had received antipsychotic treatment for a mean duration of 7.42 $\pm$ 6.20 years. Regarding the characteristics of violent offending, 82% of patients had a history of person-directed violence, whereas 18% had committed property-related offenses. Sex-stratified analyses showed no significant differences between male and female participants in psychopathology, FTD, executive functioning, or personal and social functioning. Female participants were older than male participants (Appendix1).

Table 2: Psychopathology, thought and language disorder, functioning, and executive function scores

Measure	Mean±SD
PANSS	
Total score	71.53±16.50
Positive symptoms	16.05±5.56
Negative symptoms	18.34±6.13
General psychopathology	37.41±9.13
TALD	
Objective positive	12.05±5.59
Subjective negative	6.47±3.12
Objective negative	6.30±4.29
Subjective positive	1.64±1.12
FAB	
Total score	13.38±3.50
Conceptualization	2.31±0.88
Verbal fluency	1.67±0.92
Programming	2.31±0.97
Sensitivity to interference	2.30±0.93
Inhibitory control	2.16±0.97
Environmental autonomy	2.64±0.74
PSP	
Total score	61.64±13.09
Socially useful activities	14.22±4.73
Personal and social relationships	14.30±3.76
Self-care	15.70±4.53
Disturbing and aggressive behaviors	17.42±3.45

Values are presented as mean ± standard deviation. SD: Standard deviation; FAB: Frontal Assessment Battery; TALD: Thought and Language Disorder Scale; PSP: Personal and Social Performance Scale; PANSS: Positive and Negative Syndrome Scale.

Psychopathology and functioning scores are summarized in Table 2. The mean PANSS total score was 71.53±16.50, indicating a moderate level of overall symptom severity. The mean PSP total score was 61.64±13.09. Mean PSP subscale scores were 14.22±4.73 for socially useful activities, 14.30±3.76 for personal and social relationships, 15.70±4.53 for self-care, and 17.42±3.45 for disturbing and aggressive behaviors.

Correlation analyses examining demographic and illness-related variables demonstrated no significant associations between PSP total scores and age, education level, duration of illness, duration of untreated psychosis, or number of hospitalizations (all $p > 0.05$). However,

chlorpromazine-equivalent antipsychotic dose showed a moderate positive correlation with the PSP self-care domain ($r = 0.36$, $p < 0.05$).

As shown in Table 3, PSP total scores were negatively correlated with measures of psychopathology and several dimensions of FTD. PSP total scores were negatively correlated with PANSS total ($r = -0.41$, $p = 0.001$), positive symptom ($r = -0.28$, $p = 0.028$), and negative symptom scores ($r = -0.25$, $p = 0.048$). Similar associations were observed across several PSP domains, particularly personal and social relationships and self-care.

Among the TALD dimensions, subjective negative thought disorder demonstrated the strongest and most consistent associations with functional impairment, showing significant negative correlations with PSP total scores ($r = -0.44$, $p < 0.001$), socially useful activities ($r = -0.50$, $p < 0.001$), personal and social relationships ($r = -0.47$, $p < 0.001$), and self-care ($r = -0.36$, $p < 0.01$). Objective negative thought disorder showed a similar but weaker pattern of associations. Objective positive thought disorder was also associated with poorer functioning across several domains, although the correlations were generally less pronounced. In contrast, subjective positive thought disorder was not significantly associated with functional outcomes.

Regarding executive functioning, verbal fluency was positively correlated with overall functioning ($r = 0.32$, $p < 0.05$), socially useful activities ($r = 0.39$, $p < 0.01$), personal and social relationships ($r = 0.31$, $p < 0.05$), and self-care ($r = 0.35$, $p < 0.05$). Sensitivity to interference was positively associated with socially useful activities ($r = 0.35$, $p < 0.01$) and self-care ($r = 0.46$, $p < 0.01$).

As shown in Table 4, a multiple linear regression analysis was conducted to identify factors independently associated with personal and social functioning. Variables that showed significant associations with PSP scores in bivariate analyses and were considered clinically relevant were entered into the model, including PANSS negative symptoms, subjective negative thought disorder, and executive functioning (FAB total score). The overall model was statistically significant ($F = 4.870$, $p = 0.004$), accounting for 19.6% of the variance in PSP total scores ($R^2 = 0.196$, adjusted $R^2 = 0.154$). Subjective negative thought disorder emerged as the only significant independent correlate of poorer functioning ($\beta = -0.324$, $p = 0.032$). Neither PANSS negative symptoms ($\beta = -0.044$, $p = 0.764$) nor executive functioning ($\beta = 0.200$, $p = 0.098$) remained significantly associated with PSP total scores in the multivariate model.

Table 3: Correlations of psychopathology, thought disorder, executive functioning, and functional outcomes

	PSP total	PSP social	PSP personal	PSP self-care
PANSS total score	-0.41**	-0.32**	-0.42**	-0.40**
PANSS positive symptoms	-0.28*	-0.20	-0.31*	-0.27*
PANSS negative symptoms	-0.25*	-0.24	-0.24	-0.26*
TALD objective positive	-0.34**	-0.28*	-0.30*	-0.27*
TALD subjective negative	-0.44***	-0.50***	-0.47***	-0.36**
TALD objective negative	-0.38**	-0.42**	-0.31*	-0.34**
TALD subjective positive	-0.10	-0.10	-0.15	-0.07
FAB conceptualization	-0.23	0.25*	0.09	0.14
FAB verbal fluency	0.32*	0.39**	0.31*	0.35*
FAB sensitivity to interference	0.24	0.35**	0.21	0.46**
FAB inhibitory control	0.07	0.01	-0.01	-0.08

Values are Spearman's rho correlation coefficients. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; TALD: Thought and Language Disorder Scale; FAB: Frontal Assessment Battery; PSP: Personal and Social Performance Scale; PANSS: Positive and Negative Syndrome Scale.

Table 4: Multiple linear regression analysis of factors associated with personal and social functioning (PSP total score)

Predictor	B	SE	Standardized β	t	p
FAB total score	0.747	0.445	0.200	1.681	0.098
PANSS negative symptoms	-0.093	0.310	-0.044	-0.302	0.764
TALD subjective negative	-1.357	0.618	-0.324	-2.194	0.032

Model statistics: $R = 0.442$; $R^2 = 0.196$; Adjusted $R^2 = 0.154$; $F = 4.870$; $p = 0.004$. SE: Standard error; β : Standardized regression coefficient; FAB: Frontal Assessment Battery; TALD: Thought and Language Disorder Scale; PANSS: Positive and Negative Syndrome Scale.

DISCUSSION

The present study investigated the relationships among FTD, executive functioning, and personal and social functioning in patients with schizophrenia and a history of violent offending. Several dimensions of FTD and executive functioning were associated with functional outcomes in bivariate analyses. However, after accounting for negative symptom severity and executive functioning, subjective negative thought disorder emerged as the only variable independently associated with overall functioning. These findings suggest that disturbances in the subjective experience and expression of thought may represent a particularly relevant correlate of real-world functioning in forensic schizophrenia populations.

One of the main findings was the robust association between FTD and impaired functioning. Higher levels of thought disorder were associated with poorer functioning in socially useful activities, interpersonal relationships, and self-care. Among the TALD dimensions, subjective negative thought disorder demonstrated the strongest and most consistent associations across functional domains. These findings are consistent with previous studies showing that FTD contributes substantially to communication difficulties,

impaired social reciprocity, and reduced adaptive functioning in schizophrenia spectrum disorders (17, 31). Disturbances such as impoverished thought expression, difficulties verbalizing internal experiences, and subjective experiences of cognitive fragmentation may interfere with effective communication and social problem-solving, potentially limiting the ability to maintain interpersonal relationships and perform everyday activities (19).

Importantly, subjective negative thought disorder remained independently associated with poorer functioning after accounting for negative symptoms and executive functioning. This finding extends previous research by suggesting that specific dimensions of thought disorder may be associated with disability beyond traditional symptom domains. Although negative symptoms are widely recognized as major correlates of functional outcomes in schizophrenia (3), the present findings indicate that subjective disturbances in thought and language may capture additional aspects of social and behavioral functioning that are not fully accounted for by negative symptom severity. Recent evidence has also demonstrated that objective positive and subjective negative dimensions of FTD are associated with violent offending in schizophrenia (18). Taken together, these

findings suggest that different dimensions of thought disorder may be associated with distinct adverse real-world outcomes, including violent behavior and functional disability.

The relationship between thought disorder and functioning may be particularly relevant in forensic populations. Individuals with severe disturbances in thought organization may experience difficulties interpreting social cues, communicating their needs effectively, and responding adaptively in interpersonal situations. Such impairments may contribute not only to social withdrawal and occupational dysfunction but also to maladaptive responses during stressful or conflictual encounters (5, 32). From this perspective, FTD may represent more than a diagnostic feature of schizophrenia; it may also serve as a clinically meaningful marker of vulnerability to poor social adaptation.

Executive functioning was also associated with functioning at the correlational level. Better verbal fluency was associated with better overall functioning, interpersonal relationships, and self-care, whereas greater cognitive flexibility was associated with better functioning in socially useful activities and self-care. These findings are consistent with previous studies demonstrating that executive processes, including cognitive flexibility, planning, and verbal organization, support social competence and goal-directed behavior in schizophrenia (11, 33). However, overall executive functioning did not remain independently associated with functioning in the multivariate model. This finding suggests that executive deficits may be indirectly related to functioning or may operate through mechanisms that overlap with thought disorder and broader psychopathology, rather than exerting a unique effect on functioning in this population.

Although the regression model was statistically significant, it explained only 19.6% of the variance in personal and social functioning. This finding underscores the multifactorial nature of functional outcomes in schizophrenia and suggests that additional clinical, cognitive, environmental, and psychosocial factors not assessed in the present study are likely to contribute. Variables such as medication adherence, social support, psychosocial stressors, detailed substance use characteristics, and the severity and characteristics of violent behavior may account for some of the unexplained variance.

The observed associations between executive functioning and thought disorder further support the possibility that these constructs share partially overlapping neurocognitive substrates. In particular, verbal fluency and cognitive flexibility were associated

with negative dimensions of thought disorder, consistent with previous evidence linking executive dysfunction, abnormalities in semantic processing, and communication disturbances in schizophrenia (16, 17). Future longitudinal studies incorporating neurocognitive and neurobiological measures may help clarify the mechanisms underlying these relationships.

From a clinical perspective, the present findings highlight the importance of assessing FTD in addition to symptom severity when evaluating functional outcomes in forensic schizophrenia populations. Although antipsychotic treatment remains essential for controlling psychotic symptoms, functional recovery may depend on broader cognitive and communicative capacities. Interventions targeting communication skills, social cognition, cognitive flexibility, and thought organization may therefore be valuable components of comprehensive rehabilitation programs. Incorporating structured assessments of thought disorder into routine clinical and forensic evaluations may also facilitate individualized treatment planning and improve long-term psychosocial outcomes.

Several limitations should be considered when interpreting the findings of this study. First, the cross-sectional design precludes conclusions regarding causal relationships among FTD, executive functioning, and functional impairment. Longitudinal studies are needed to clarify the temporal and potentially bidirectional relationships among these variables. Second, the relatively small sample size and inclusion of only forensic inpatients with a history of violent offending may limit the generalizability of the findings to broader schizophrenia populations. In addition, the absence of a comparison group without a history of violent offending limits conclusions regarding whether the observed associations are specific to this forensic sample. Third, the severity and characteristics of violent offending were not assessed using a standardized violence severity instrument. Therefore, different forms of violent behavior, which may involve distinct neuropsychological and clinical mechanisms, could not be examined separately. Fourth, executive functioning was assessed using the Frontal Assessment Battery, a brief screening instrument, rather than a comprehensive neuropsychological battery. The findings regarding executive functioning should therefore be interpreted cautiously, and broader conclusions regarding executive functioning cannot be drawn. Fifth, psychiatric comorbidities, including personality disorders, were not systematically assessed using a structured diagnostic interview, and intellectual disability was excluded based on clinical

evaluation rather than standardized psychometric testing. These factors may have influenced executive functioning, FTD, and functional outcomes. Finally, several potentially relevant factors, including medication adherence, detailed substance use characteristics, psychosocial stressors, social support, and the severity or frequency of violent behavior, were not evaluated and may have influenced functional outcomes. These unmeasured factors may also partly explain the relatively modest proportion of variance in functioning accounted for by the regression model.

Despite these limitations, the study has several notable strengths. To our knowledge, relatively few studies have simultaneously examined FTD, executive functioning, and personal and social functioning in patients with schizophrenia and a history of violent offending. The use of the Thought and Language Disorder Scale allowed for a multidimensional assessment of both subjective and objective aspects of thought disorder, providing a more nuanced understanding of their relationships with functioning. Furthermore, the inclusion of both PSP total and domain-specific functioning measures enabled the identification of specific areas of functioning associated with thought disorder and executive functioning. Finally, the multivariate analysis identified subjective negative thought disorder as an independent correlate of functional impairment after accounting for negative symptom severity and executive functioning. Together, these findings contribute to a growing body of evidence suggesting that real-world functioning in schizophrenia is associated not only with psychopathology but also with disturbances in thought organization, communication, and cognitive functioning.

CONCLUSION

Formal thought disorder was associated with functional impairment in this forensic sample of patients with schizophrenia and a history of violent offending. Among the clinical and cognitive variables examined, subjective negative thought disorder was the only variable independently associated with personal and social functioning, suggesting that disturbances in the subjective experience and expression of thought may represent an important correlate of real-world disability beyond negative symptom severity and executive dysfunction. These findings highlight the potential value of incorporating detailed assessments of thought disorder into functional evaluation and rehabilitation planning in forensic schizophrenia populations.

Ethical Approval: This study was approved by The Ethics Committee of Ankara Bilkent City Hospital (approval number: 1-24-470, date: 07.08.2024).

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Category 1	Concept/Design	G.B., E.K.S., M.U.
	Data acquisition	G.B.
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Category 2	Drafting manuscript	G.B.
	Critical revision of manuscript	E.K.S., M.U., G.Z.K.
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Other	Technical or material support	M.U.
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Appendix 1: Demographic, clinical, cognitive, and functional characteristics of the forensic schizophrenia sample by sex

Variables	Female (n=17)	Male (n=47)	p
Age (years)	45.29±9.97	38.62±9.61	0.024
Education (years)	10.76±4.51	10.15±3.95	0.623
Duration of untreated psychosis (years)	8.41±11.09	6.36±7.88	0.491
PANSS total score	70.88±17.80	71.77±16.21	0.859
PANSS positive symptoms	17.12±6.72	15.66±5.10	0.424
PANSS negative symptoms	17.00±4.46	18.83±6.60	0.213
CDSS	1.82±1.55	2.57±2.85	0.186
PSP total score	67.06±12.88	59.68±12.74	0.052
FAB total score	13.94±2.63	13.17±3.77	0.366
TALD total score	27.29±9.12	26.98±10.00	0.906

Values are presented as mean±standard deviation. Between-group comparisons were performed using independent-samples t tests. Statistical significance was set at $p<0.05$. TALD: Thought and Language Disorder Scale; FAB: Frontal Assessment Battery; PSP: Personal and Social Performance Scale; PANSS: Positive and Negative Syndrome Scale; CDSS: Calgary Depression Scale for Schizophrenia.