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1 ABOUT THE JOURNAL

Dusunen Adam Journal of Psychiatry and Neurological Sciences is an open access, peer reviewed scientific journal published quarterly on March, June, September and December; and four issues constitute a volume annually. Dusunen Adam Journal of Psychiatry and Neurological Sciences has been the official journal of *Bakirkoy Prof. Mazhar Osman Training and Research Hospital for Psychiatry, Neurology and Neurosurgery* since 1984.

2 AIMS AND SCOPE

Dusunen Adam Journal of Psychiatry and Neurological Sciences is an international, peer-reviewed open-access journal for clinicians, scholars, and research scientist in psychiatry, mental health, behavioral sciences, neuroscience, and related fields. The journal has been published periodically since 1984 by the Bakirkoy Prof. Mazhar Osman Training and Research Hospital for Psychiatry, Neurology and Neurosurgery. Dusunen Adam Journal of Psychiatry and Neurological Sciences aims to educate readers on mental health and related disciplines as well as to stimulate further contributions into the field. The journal considers original research papers, brief reports and letters to the editor on all aspects of psychiatry, psychiatric disorders, neuroscience and major topics related to field. The primary scope of the journal encompasses clinical, preclinical, and clinically-relevant field studies attempting to address biological and psychosocial determinants of psychiatric and neuropsychiatric disorders, as well as diagnostic assessments, and pharmacologic and non-pharmacologic treatments.

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6.6.3 Samples for References

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Articles in the Turkish journal:

Gulec H. Temperament and character dimensions of the patient with schizophrenia, relatives of schizophrenic patients, and the healthy controls. Noro Psikiyatr Ars 2009; 46:8-12. (Turkish)

2. Articles in supplement:

Fichter MM, Quadflieg N. Long-term stability of eating disorder diagnoses. Int J Eat Disord 2007; 40(Suppl.):61-66.

Articles in the Turkish supplement:

Oral ET. History of bipolarity and endophenotypes. Anatolian Journal of Psychiatry 2009; 10(Suppl.1):8-9. (Turkish)

3. For the articles in press:

Blumgart E, Tran Y, Craig A. Social anxiety disorder in adults who stutter. Depress Anxiety 2010 (in press)

In case that the article has a DOI ahead of print, the DOI should be written in place of (in press) at the end of the reference.

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Yildiz M, Yazici A, Cetinkaya O, Bilici R. Relatives' knowledge and opinions about schizophrenia. Turk Psiyatri Derg 2010 (in press). (Turkish) In case that the article has a DOI ahead of print, the DOI should be written in place of (in press) at the end of the reference.

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James C. Psychiatric Disorders in Persons With Intellectual Disability: In Gabbard GO (editor). Treatments of Psychiatric Disorders. Fourth Ed. Washington: American Psychiatric Publishing Inc., 2007, 93-119.

For a section of a book with more than one editor:

1. Hollander E, Simeon D. Panic Disorder: In Hales RE, Yudofsky SC (editors). Essentials of Clinical Psychiatry. Arlington: American Psychiatric Publishing Inc., 2004, 339-359.

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2. Den Boer JA, George MA, Ter Horst GJ (editors). Transcranial magnetic stimulation and vagus nevre stimulation: new approaches to antidepressant treatment. In: Current and Future Developments in Psychopharmacology. First ed. Amsterdam: Benecke N.I., 2004, 27-61.

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Saddock BJ, Saddock VA. Clinical Psychiatry. Aydın H, Bozkurt A (Translation Editor) Second ed., Ankara: Gunes Kitabevi Ltd. Sti., 2005, 155-157. (Turkish)

5. For quotations from a thesis:

Dalbudak E. Relationship of posttraumatic stress disorder and personality dimensions with quality of life in male alcohol dependents. Postgraduate Thesis, Bakirkoy Training and Research Hospital for Psychiatry Neurology and Neurosurgery, Istanbul, 2008. (Turkish)

6. For quotations from congress papers:

Akvardar Y, Arkar H, Gul S, Akdede BB. Personality dimensions in alcohol use disorders. National Psychiatry Congress, Proceeding Book, 2003, 603-604. (Turkish)

7. For quotations from Web references:

As a minimum, the full URL and the date when the reference was last accessed should be given. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Guidelines and Recommendations: Interim Guidance about Avian Influenza (H5N1) for U.S. Citizens Living Abroad https://wwwnc.cdc.gov/travel/page/avian-flu-americans-abroad. Accessed August 1, 2018.

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GUEST EDITORIAL

Promoting good research practices in neuroscience: A foundation for integrity

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Neuroscience, as a rapidly advancing interdisciplinary field, holds immense potential for both clinical applications and the development of brain-inspired technologies. However, this potential fundamentally depends on the integrity of the research processes that generate foundational knowledge. In this editorial, I aim to discuss the principles of research integrity and good research practice within the context of neuroscience.

One of the most fundamental questions in neuroscience research concerns the rationale behind conducting scientific inquiry in this field. Beyond the pursuit of knowledge, the primary objectives often include elucidating the pathophysiology of neurological disorders, identifying and developing therapeutic targets, and advancing our understanding of the brain's complex functional architecture. These aims not only serve clinical interests but also provide essential knowledge for the development of novel technologies, such as advanced artificial intelligence systems inspired by neural computation.

Given the translational potential of neuroscience research, it is imperative that scientific endeavors be conducted with the highest standards of honesty, transparency, and reproducibility. These principles are encapsulated within the concept of research integrity, which serves as the cornerstone of scientific credibility. Closely related is the framework of Good Research Practice (GRP) (1), which operationalizes integrity through rigorous methodological and ethical standards. Adherence to these principles ensures that research outcomes can be reliably translated into therapeutic innovations and technological advancements.

Research integrity is defined by Imperial College London (2) as "conducting research in a way that allows others to have trust and confidence in the methods used and the findings that result." It reflects not only the quality of individual research projects but also the reputation of the institution, its researchers, and the broader research community. Therefore, scientific integrity constitutes a cornerstone of credible academic inquiry. Beyond safeguarding the professional reputation of researchers, it fosters public confidence in science and underpins broader socio-economic advancement (3).

The European Code of Conduct for Research Integrity (2023 revision) defines the core principles of research integrity as: reliability, honesty, respect, and accountability (4). According to ALLEA (All European Academies), these principles encompass research quality, transparency, fairness, respect for all stakeholders (researchers, society, the ecosystem), and good practices throughout the research cycle—from idea generation to data collection, supervision, and publication.

It is evident that research integrity and good practices are essential for neuroscience. Therefore, it is crucial to understand the components of research integrity and foster a culture that fully embraces them. This culture will ultimately benefit researchers, patients, funding agencies, governments, and the public. Clear and transparent research grounded in honest data enables the development of effective and well-founded diagnostic and treatment approaches for neurological disorders.

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One critical component of research integrity is the research environment. While this often refers to capacity building, it also involves much more. Bland and Ruffin (5) analyzed the literature to identify characteristics of successful research environments. Key elements include a clear research strategy, an organization that values research, research-oriented leadership, and access to resources. In today's context, data management and data protection should be added to this list.

Another essential component of good research practice is training, supervision, and mentoring. Research institutions should provide comprehensive training in research design and methodology, offer ethics- and integrity-focused education, and ensure that researchers at all career stages receive ongoing guidance. Mentorship, particularly from senior researchers, plays a crucial role. Good mentors foster good researchers. In practice, early-career researchers often learn through the day-to-day conduct of their mentors. For master's and PhD programs, structured training steps and regular supervision should be clearly defined. Supervisors should enable students and postdoctoral researchers to conduct all stages of research with rigor, honesty, and transparency. Training on transparency, ethics, reproducibility, and integrity must be incorporated throughout. Organizations like ORPHEUS (Organisation for PhD Education in Biomedicine and Health Sciences in the European System), in collaboration with the Association of Medical Schools in Europe (AMSE) and the World Federation for Medical Education (WFME), have developed best practices for PhD training (6).

Publication and dissemination of research results are equally critical, as they can influence future clinical practices. Researchers must take responsibility for their data, making it publicly available and reporting both positive and negative results with honesty. Authorship disputes are another concern. Most journals now require a detailed contribution statement to prevent issues such as ghost, guest, or gift authorship. Organizations such as the Committee on Publication Ethics (COPE), the International Committee of Medical Journal Editors (ICMJE), and the World Health Organization (WHO) provide guidelines to promote transparency, open data, and ethical publishing practices.

An additional issue in the discussion of good practices is research misconduct, which remains relatively common. Misconduct includes data fabrication, falsification, image manipulation, plagiarism, undisclosed conflicts of interest, and result misinterpretation. Bonn and Pinxten (7) identified potential causes of misconduct, including unrealistic expectations, hyper-competitive research cultures, limited resources and mentoring, and lack of time for proper research.

As neuroscience continues to intersect with clinical practice and emerging technologies, the need for trustworthy, reproducible, and ethically sound research becomes increasingly urgent. Research integrity and good research practice are not peripheral—they are central to advancing both scientific understanding and technological innovation.

Establishing a culture of integrity requires institutional commitment, researcher education, and systemic reforms in funding, publication, and evaluation. Only through such comprehensive efforts can neuroscience realize its potential to transform medicine and society.

In summary, research integrity and good research practices are not merely procedural—they are the foundation of credible, impactful science. Neuroscience, a discipline bridging biology, psychology, medicine, and technology, has both the opportunity and the responsibility to lead in ethical and rigorous research. Through transparency, accountability, and ongoing education, the neuroscience community can foster trust, drive innovation, and make meaningful contributions to both science and society.

Conflict of Interest: The author have no conflict of interest to declare.

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RESEARCH ARTICLE

The association of impulsivity and metacognitive beliefs in adjustment disorder: A cross-sectional study

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University of Health Sciences Erzurum Faculty of Medicine, Department of Psychiatry, Erzurum, Turkiye

ABSTRACT

Objective: Adjustment Disorder (AD) is a stress-related condition characterized by emotional and behavioral symptoms triggered by various identifiable stressors. Impulsivity, marked by difficulties in decision-making and control, and deficits in metacognition, which regulate cognitive awareness, are common in AD. This study explores potential associations between dimensions of impulsive behavior, as defined by the UPPS (Urgency, Premeditation, Perseverance, Sensation Seeking) model, and metacognitive beliefs in individuals with AD.

Method: This cross-sectional study included 75 male individuals diagnosed with AD and 60 healthy male controls. Participants were recruited from a clinical setting and completed self-report measures, including the Metacognitions Questionnaire-30 (MCQ-30) and the UPPS Impulsive Behavior Scale, to assess metacognitive beliefs and impulsivity.

Results: Individuals with AD had significantly higher scores on the MCQ-30 ($F=50.559$, $p<0.001$), particularly on the subscales of negative beliefs about worry ($F=28.341$, $p<0.001$), and need to control thoughts ($F=57.427$, $p<0.001$), as well as on total metacognitive beliefs ($F=20.143$, $p<0.001$). Regarding impulsivity, as measured by the UPPS Impulsive Behavior Scale, the AD group showed significantly elevated scores on lack of premeditation ($F=15.952$, $p<0.001$) and lack of perseverance ($F=22.411$, $p<0.001$), with no significant group differences in urgency or sensation seeking ($p>0.05$). Correlation analyses revealed that MCQ-30 negative beliefs about worry were positively associated with UPPS lack of premeditation ($r=0.338$, $p<0.01$) and lack of perseverance ($r=0.234$, $p<0.01$). The strongest correlations were found between the MCQ-30 need to control thoughts and impulsivity, particularly lack of perseverance ($r=0.385$, $p<0.01$) and total impulsivity ($r=0.375$, $p<0.01$), suggesting a strong link between dysfunctional metacognitive beliefs and impulsivity in individuals with AD.

Conclusion: These findings may inform future clinical approaches targeting impulsivity and metacognitive beliefs in individuals with AD. Future research should investigate these factors longitudinally, evaluate the effectiveness of specific interventions, and explore sociodemographic influences on clinical outcomes.

Keywords: Adjustment disorders, impulsive behavior, metacognition, cognitive control, cross-sectional studies

INTRODUCTION

The definition of Adjustment Disorder (AD) has evolved over time; nevertheless, it has been consistently included in psychiatric classifications since 1952. The reclassification of AD under trauma- and stressor-related disorders in DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition) marked a significant advancement and has contributed substantially to growing academic interest in the

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condition. According to the American Psychiatric Association (1), AD is characterized by psychological and behavioral responses to identifiable stressors, leading to significant impairment in daily functioning. Common symptoms include anxiety, depression, irritability, and behavioral disturbances, with an estimated lifetime prevalence in adults ranging from 5% to 21% (2). These clinical features are closely tied to difficulties in stress regulation and impaired cognitive control mechanisms (2). However, research focusing specifically on the cognitive processes in AD, particularly in relation to metacognitive beliefs and impulsive tendencies, remains limited (3, 4).

Beyond emotional fluctuations, AD is associated with significant alterations in cognitive processes. Specifically, metacognitive functions, such as cognitive flexibility, the organization of thought processes, and the ability to evaluate one's own cognitive activity, play a crucial role in the development and trajectory of the disorder (4). Additionally, impulsivity—a multidimensional construct characterized by acting without adequate forethought, difficulties in cognitive control, and rapid, reward-driven decision-making without consideration of negative consequences—is also relevant to understanding maladaptive responses to stress (5, 6). Given the established relationship between impulsivity and impaired cognitive control observed across various psychiatric conditions (7, 8), exploring the interplay between impulsivity and metacognitive processes in AD may offer valuable insights into the potential cognitive vulnerabilities underlying stress-related symptoms. Recent evidence specifically highlights that impulsivity and maladaptive metacognitive beliefs frequently co-occur, with impulsive individuals more likely to rely on dysfunctional metacognitive strategies such as thought suppression, rigid beliefs about cognitive uncontrollability, and persistent negative metacognitive patterns (3). These maladaptive strategies may exacerbate psychological distress and undermine adaptive coping, potentially contributing to the persistence of stress-related symptoms in AD. Metacognitive beliefs are generally categorized as functional or dysfunctional. Functional metacognitive beliefs are helpful and adaptive assumptions that support effective emotion regulation and cognitive control (e.g., "worrying helps me cope"). In contrast, dysfunctional metacognitive beliefs refer to maladaptive assumptions, such as the belief that thoughts are uncontrollable or harmful, which can intensify distress and potentially contribute to psychopathology (9, 10).

Impulsivity significantly influences cognitive regulation in psychiatric conditions characterized by deficits in cognitive control, notably Attention-Deficit/Hyperactivity Disorder (ADHD) (11). Butzbach et al. (11) (2021) investigated the relationship between impulsivity and metacognitive processes in ADHD and reported that, despite theoretical assumptions about their interplay, they could not establish direct quantitative links due to methodological constraints such as measurement limitations and sample characteristics. Nevertheless, their findings suggest that this interaction may be relevant and merits further examination in stress-related conditions. Similarly, studies on Post-Traumatic Stress Disorder (PTSD), a condition diagnostically related to AD, have reported associations between maladaptive metacognitive beliefs, such as perceived uncontrollability and cognitive threat, and elevated symptom severity (10–13). Given these preliminary findings, further research is needed to determine whether similar patterns are observed in individuals with AD and to explore how cognitive and metacognitive variables may relate to symptom presentation.

Given findings from related psychopathologies, it is important to investigate whether similar metacognitive disruptions and specific impulsivity-related tendencies—such as lack of premeditation, lack of perseverance, urgency, and sensation seeking—contribute to the persistence of maladaptive cognitive and behavioral patterns in individuals with AD. The present study aims to explore the associations between these impulsivity dimensions (as measured by the UPPS scale, which assesses Urgency, Premeditation, Perseverance, and Sensation Seeking), metacognitive control processes (e.g., cognitive flexibility and regulatory beliefs), and their potential role in adjustment-related psychological difficulties. In doing so, this study seeks to address a gap in the literature by integrating specific cognitive and behavioral traits into a functional model of AD.

We hypothesize that: (1) individuals diagnosed with AD will exhibit higher levels of impulsivity-related traits across certain UPPS dimensions and more dysfunctional metacognitive beliefs compared to healthy controls; (2) based on previous findings in PTSD and other stress-related disorders, elevated impulsivity traits—particularly lack of premeditation and lack of perseverance—will be associated with impairments in metacognitive regulation and increased cognitive rigidity, potentially contributing to symptom severity in AD (9, 10); (3) dysfunctional

metacognitive beliefs may help clarify the relationship between these impulsivity tendencies and maladaptive cognitive patterns, potentially reflecting mechanisms underlying adjustment-related dysfunctions.

METHODS

Study Design and Participants

This cross-sectional study, which employed structured clinical interviews for diagnostic assessment and standardized self-report scales to evaluate impulsivity and metacognitive beliefs, was conducted between March 1, 2024 and February 1, 2025. The study group consisted of male individuals who presented to the psychiatry outpatient clinic of a tertiary-care public hospital with adjustment difficulties that began following the commencement of their compulsory military service at a male-only institution. The control group comprised healthy male individuals who attended the hospital's medical reporting department for mandatory pre-employment or periodic psychiatric evaluations. These individuals had no known or reported psychiatric complaints or diagnoses.

A total of 75 patients diagnosed with AD and 60 healthy controls participated in the study. Participants were recruited consecutively through voluntary participation, and informed consent was obtained from all individuals. Initially, 92 male individuals presenting to the psychiatry outpatient clinic with adjustment-related difficulties were screened for eligibility. Of these, 17 were excluded for the following reasons: not meeting DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition) criteria for Adjustment Disorder (n=9), having comorbid psychiatric diagnoses such as depressive or anxiety disorders (n=4), or declining to participate in the study (n=4). Consequently, 75 participants who met all inclusion and exclusion criteria were enrolled in the study. All participants completed the required assessments without any missing data. Although the exact duration of symptoms was not systematically recorded, clinical profiles obtained during structured interviews consistently indicated that Adjustment Disorder symptoms predominantly emerged within approximately one to three months following the participants' initial deployment to their military service units. Given the timing of presentation, our sample can be accurately characterized as experiencing an acute stress-related adjustment response rather than chronic manifestations. None of the included participants reported symptom durations exceeding six months, clearly aligning with the diagnostic criteria for acute Adjustment Disorder according to the DSM-5.

Inclusion criteria for the AD group were as follows: male volunteers aged 18-40 years (this age range and setting were selected because young adult males undergoing compulsory structured service are exposed to significant adjustment demands, making them an appropriate population for examining stress-related disorders such as AD); meeting the DSM-5 diagnostic criteria for AD, confirmed through clinical evaluation and the Structured Clinical Interview for DSM-5-Clinical Version (SCID-5-CV) conducted by two experienced psychiatrists; no history of neurological disorders, head trauma, or substance/alcohol abuse or dependence within the past six months; and no current or past psychiatric diagnoses other than AD. Participants in the control group were also aged 18-40 years and underwent structured clinical interviews by psychiatrists to confirm the absence of psychiatric disorders, neurological conditions, substance use, or any other factors affecting cognitive or psychiatric functioning.

Exclusion criteria for both groups included the presence of intellectual disabilities, illiteracy, or any psychiatric disorders such as mood disorders, anxiety disorders, psychotic disorders, substance use disorders, or personality disorders, as assessed through clinical interviews based on DSM-5 criteria using the SCID-5-CV.

The decision to include only male participants was made because the institution involved in the mandatory service placement exclusively employs male personnel, thereby limiting potential gender-related confounding variables in the study population.

Ethical approval for the study was granted by the local ethics committee on February 28, 2024. Data were collected through face-to-face interviews conducted by trained psychiatrists. Participants completed self-report questionnaires, including the Metacognition Questionnaire-30 (MCQ-30) for assessing metacognitive beliefs and processes, the UPPS Impulsive Behavior Scale for evaluating impulsivity dimensions, and a Sociodemographic Data Form to capture demographic and clinical characteristics. Data confidentiality was strictly maintained, with all responses anonymized and securely stored. Statistical analyses were conducted to explore the relationships among impulsivity, metacognitive beliefs, and AD symptomatology, adjusting for potential confounders identified in sociodemographic analyses.

Procedure

Instruments and Measurements

Sociodemographic Data Form

This form included information on age, gender, educational status, occupation, employment status, marital status, smoking, alcohol, and substance use, history of traumatic experiences, parental relationship status, and any past suicide attempts.

Metacognition Questionnaire-30

The MCQ-30, developed by Wells and Cartwright-Hatton in 2004 (13, 14), is a widely used instrument designed to evaluate metacognitive beliefs and processes. It consists of five distinct subscales: positive beliefs about worry, negative beliefs about worry, cognitive confidence, need to control thoughts, and cognitive self-consciousness. Positive beliefs about worry assess the belief that worrying is useful and facilitates coping. Negative beliefs about worry evaluate the perception that worrying is uncontrollable and dangerous. Cognitive confidence measures low confidence in memory and other cognitive abilities. The need to control thoughts reflects the belief that certain thoughts must be suppressed or controlled. Cognitive self-consciousness assesses the tendency to focus attention on one's own thought processes. Each subscale contains six items rated on a 4-point scale, generating total scores ranging from 6 to 24. Higher scores indicate stronger positive and negative beliefs about worry, reduced confidence in memory, an increased conviction regarding the necessity of thought control, and a heightened tendency toward self-focused attention. In addition to subscale scores, a total score can be calculated by summing all item responses, providing a global index of dysfunctional metacognitive beliefs. The MCQ-30 has demonstrated excellent internal consistency, along with strong convergent and predictive validity in non-clinical populations. The Turkish adaptation of the scale was conducted by Yılmaz et al. (2008) (15), who reported a Cronbach's alpha of 0.86 for the total score and provided supportive evidence for construct validity in a Turkish sample (15, 16).

The UPPS Impulsive Behavior Scale

The UPPS Impulsive Behavior Scale (UPPS), developed by Lynam and Whiteside (17), is a 45-item self-report measure rated on a 4-point Likert scale. The name of the scale is derived from the initials of four dimensions of impulsivity identified by the authors: Urgency, (lack of) Premeditation, (lack of) Perseverance, and Sensation Seeking. Urgency refers to the tendency to act impulsively in response to negative emotions; Premeditation (reverse scored) refers to the tendency to think and plan before acting; Perseverance (reverse scored) reflects the ability to remain focused on difficult or monotonous tasks; and Sensation Seeking indicates a preference for stimulating and novel experiences. Higher scores on the UPPS reflect stronger levels of the respective impulsivity dimensions, indicating greater urgency, lower premeditation and perseverance, and higher sensation-seeking tendencies. The Turkish adaptation and validation study was conducted by Yargıç et al. (18). The scale demonstrated high internal consistency, with a Cronbach's alpha of 0.85, and a test-retest reliability of 0.81.

The Metacognitions Questionnaire-30 (15, 16) and the UPPS Impulsive Behavior Scale (17, 18) were selected based on their strong psychometric properties and validated use in both international and Turkish young adult populations. These instruments are widely employed in both clinical and non-clinical research involving metacognition and impulsivity

Statistical Analysis

All statistical analyses were conducted using IBM SPSS Statistics version 18 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the sociodemographic, behavioral, and clinical characteristics of the participants. The normality of continuous variables was assessed using the Shapiro-Wilk test.

Between-group comparisons for continuous variables were conducted using independent samples t-tests, while categorical variables were analyzed using the Chi-Square (χ^2) test. For all group comparisons, effect sizes were reported using Cohen's d for continuous variables and Cramér's V for categorical variables.

To adjust for potential confounders (age, education level, employment status, marital status, and smoking), one-way Analysis of Covariance (ANCOVA) tests were conducted on UPPS and MCQ-30 scores, with F statistics, p-values, and partial η^2 reported. Within the AD group, two-tailed Pearson correlations were used to examine associations among impulsivity subscales and metacognitive belief dimensions ($p<0.05$). Finally, a forward stepwise (Likelihood Ratio) binary logistic regression was conducted to identify which variables that differed significantly between groups predicted AD group membership. Multicollinearity was checked via Variance Inflation Factor (VIF <2) and regression coefficients (B), standard errors (SE), Wald χ^2, odds ratios (Exp(B)), and 95% confidence intervals (CIs) were reported.

Table 1: Comparison of sociodemographic and behavioral characteristics between individuals with AD and healthy control groups (total (n=135)]

Variables	AD (n=75)	Control (n=60)	t/χ^2	p	Cramér's V/Cohen's d
Age, median (min–max), years	23.00 (21–28)	24.35 (18–29)	-1.331	0.183	0.240
Education level, n (%)			81.761	**<0.001**	0.792
Middle school graduate	51 (68.0)[a]	9 (15.0)[b]			
High school graduate	19 (25.3)[a]	1 (1.7)[b]			
University graduate	5 (6.7)a	50 (83.3)[b]			
Employment status, n (%)			1.123	0.289	0.134
Employed	72 (96.0)	55 (91.7)			
Unemployed	3 (4.0)	5 (8.3)			
Marital status, n (%)			14.946	**<0.001**	0.333
Single	62 (82.7)	31 (51.7)			
Married (living together)	13 (17.3)	29 (48.3)			
Smoking status, n (%)			39.273	**<0.001**	0.539
Non-smoker	4 (5.3)	32 (53.3)			
Smoker	71 (94.7)	28 (46.7)			

Superscripts a,b indicate row-wise significant differences at p<0.05 (a: AD > Control; b: Control > AD. AD: Adjustment disorder; Min: Minimum; Max: Maximum. p<0.05 was considered statistically significant. Student's t-test was used for continuous variables; Chi-Square test was used for categorical variables.

Ethical Approval

The research protocol was approved by the Scientific Research Ethics Committee of the University of Ataturk University Faculty of Medicine Research Hospital (28.02.2024 - B.30.2.ATA.0.01.00/161) and adhered strictly to the principles outlined in the Declaration of Helsinki.

RESULTS

As shown in Table 1, no significant difference was found in age between the AD and healthy control groups (t=-1.331, p=0.183, Cohen's d=0.240). However, significant group differences were observed in education level (χ^2=81.761, p<0.001, Cramér's V=0.792), marital status (χ^2=14.946, p<0.001, Cramér's V=0.333), and smoking status (χ^2=39.273, p<0.001, Cramér's V=0.539), with the AD group showing lower educational attainment, higher rates of being single, and significantly higher smoking prevalence. Employment status did not differ significantly between groups (χ^2=1.123, p=0.289, Cramér's V=0.134).

A one-way ANCOVA was conducted to compare levels of impulsivity and metacognitive beliefs between individuals with AD and healthy controls, while controlling for age, education level, employment status, marital status, and smoking status. As shown in Table 2, the AD group exhibited significantly higher scores on several subscales of the UPPS Impulsive Behavior Scale: lack of premeditation (F=15.952, p<0.001, η^2=0.110, large effect), lack of perseverance (F=22.411, p<0.001, η^2=.0149, large effect), and total impulsivity (F=20.587, p<0.001, η^2=0.136, large effect). No significant differences were observed in urgency (F=1.712, p=0.193, η^2=0.013, small effect) or sensation seeking (F=0.028, p=0.867, η^2=0.000, negligible effect). Regarding metacognitive beliefs measured by the MCQ-30, the AD group scored significantly higher than the control group on cognitive confidence (F=50.559, p<0.001, η^2=0.283, large effect), negative beliefs about worry (F=28.341, p<0.001, η^2=0.181, large effect), need to control thoughts (F=57.427, p<0.001, η^2=0.310, large effect), and total metacognition (F=20.143, p<0.001, η^2=0.136, large effect). No significant group differences were found in positive beliefs about worry (F=0.647, p=0.423, η^2=0.005, negligible effect) or cognitive self-consciousness (F=2.573, p=0.111, η^2=0.020, small effect).

A correlation analysis was carried out between the MCQ-30 and the UPPS Impulsive Behavior Scale (Table 3). Notably, positive beliefs about worry correlated significantly with the total UPPS score (r=0.186, p<0.05). Higher cognitive confidence was significantly associated with greater lack of premeditation (r=0.275, p<0.01) and lack of perseverance (r=0.283, p<0.01). Negative beliefs about uncontrollability and danger were significantly related to the lack of premeditation (r=0.338, p<0.01) and lack of perseverance (r=0.234, p<0.01). Cognitive self-consciousness showed a significant negative correlation with sensation

Table 2: Comparison of impulsivity and metacognitive beliefs between individuals with AD and healthy control groups

All patients (n=135)	AD (n=75) Mean±SD	Control (n=60) Mean±SD	F	p	Partial η^2
UPPS Impulsive Behavior Scale					
Lack of premeditation	29.29±7.65	22.10±8.02	15.952	**<0.001**	0.235
Urgency	33.23±6.56	32.42±16.04	1.712	0.193	0.013
Sensation seeking	26.60±6.39	26.92±8.34	0.028	0.867	0.000
Lack of perseverance	29.25±5.46	23.88±5.13	22.411	**<0.001**	0.149
Total	118.40±15.46	102.85±16.84	20.587	**<0.001**	0.136
Metacognitions Questionnaire-30					
Positive beliefs about worry	13.80±4.53	10.11±4.29	0.647	0.423	0.005
Cognitive confidence	16.99±4.85	8.48±3.38	50.559	**<0.001**	0.283
Negative beliefs about worry	17.23±3.84	10.78±3.80	28.341	**<0.001**	0.181
Cognitive self-consciousness	16.37±3.73	13.65±3.99	2.573	0.111	0.020
Need to control thoughts	18.53±4.23	10.17±3.65	57.427	**<0.001**	0.310
Total	77.92±22.18	53.33±13.72	20.143	**<0.001**	0.136

AD: Adjustment disorder; SD: Standard deviation; p<0.05 was considered statistically significant. An Analysis of Covariance (ANCOVA was conducted using age, education level, employment status, marital status, and smoking status as covariates.

Table 3: Correlations between subscales of the UPPS Scale and the MCQ-30 within the AD group

Variables, r	UPPS Impulsive Behavior Scale				
	Lack of premeditation	Urgency	Sensation seeking	Lack of perseverance	Total
MCQ-30					
Positive beliefs about worry	0.164	-0.013	0.023	0.082	0.186*
Cognitive confidence	0.275**	0.048	-0.059	0.283**	0.332**
Negative beliefs about worry	0.338**	0.023	-0.190*	0.234**	0.244**
Cognitive self-consciousness	0.162	-0.116	-0.208*	-0.060	0.018
Need to control thoughts	0.396**	0.045	-0.085	0.385**	0.375**
Total	0.232**	0.012	-0.077	0.115	0.201*

r: Correlation coefficient. *: Correlation was significant at the 0.05 level (two-tailed); **: Correlation was significant at the 0.01 level (two-tailed). MCQ-30: Metacognitions Questionnaire-30; AD: Adjustment disorder. The correlation analyses reported in Table 3 were conducted exclusively within the AD group.

seeking (r=-0.208, p<0.05). The need to control thoughts exhibited significant positive correlations with the lack of premeditation (r=0.396, p<0.01) and lack of perseverance (r=0.385, p<0.01). The total MCQ-30 score correlated significantly with the lack of premeditation (r=0.232, p<0.01) and the total UPPS Impulsive Behavior Scale score (r=0.201, p<0.05). These findings suggest that individuals with more dysfunctional metacognitive beliefs tend to exhibit lower levels of premeditation and generally higher impulsivity tendencies.

Smoking status (B=6.15, p=0.002, Exp(B)=469.79, 95% CI [9.24, 23,890.58]) and lower education level (B=-0.83, p=0.000, Exp(B)=2.30, 95% CI [1.45, 3.65]) significantly increased the odds of being in the AD group. Furthermore, higher levels of lack of perseverance (B=0.26, p=0.008, Exp(B)=0.77, 95% CI [0.64, 0.93]) and lower cognitive confidence (B=0.39, p=0.029, Exp(B)=0.68, 95% CI [0.48, 0.96]) were also associated with increased risk. The need to control thoughts was not a statistically significant predictor in the final model (p=0.308) (Table 4).

DISCUSSION

The findings from the current study indicate significant differences in impulsivity and metacognitive processes among individuals with AD who were undergoing a mandatory structured service period, compared to controls (Table 2). Specifically, elevated scores in the impulsivity sub-dimensions, lack of premeditation and lack of perseverance suggest

Table 4: Binary logistic regression analysis of predictors for AD group membership

Variable	B	SE	p	Exp(B)	95% CI for Exp(B)
Education level	-0.832	0.237	0.000	2.297	1.445–3.653
Smoking (yes)	6.152	2.005	0.002	469.79	9.238–23,890.576
Lack of Perseverance (UPPS)	0.261	0.098	0.008	0.771	0.636–0.934
Cognitive Confidence (MTQ-30)	0.390	0.179	0.029	0.677	0.477–0.962
Need to Control Thoughts (MTQ-30)	0.129	0.127	0.308	0.879	0.685–1.127
Constant	1.554	2.479	0.531	4.729	–

This binary logistic regression analysis was conducted to identify significant predictors of AD group membership using a forward stepwise (likelihood ratio) method. The final model at Step 5 demonstrated a good fit (Nagelkerke R^2=0.914, classification accuracy=94.1%). Variables tested but excluded from the final model due to lack of statistical significance included: marital status, lack of premeditation (UPPS), and negative beliefs about worry (MCQ-30). SE: Standard error; ExpB: Exponential Beta; CI: Confidence interval; AD: Adjustment disorder.

impaired self-regulatory capacities that may be relevant to the clinical manifestation of AD (Table 2). These results align with prior research conducted within the context of structured service, indicating that deficits in impulse and emotional control are associated with adjustment difficulties (19). Notably, individuals with impaired impulse control are more likely to experience conflicts with authority figures, struggle with rule adherence, and display increased aggression, suggesting impulsivity as a potential transdiagnostic risk factor that may extend beyond structured environments (20).

Metacognitive processes have been widely recognized as critical contributors to the development and persistence of various psychopathologies, particularly stress-related disorders (21). Since AD involves maladaptive psychological and behavioral responses triggered by identifiable stressors (22), dysfunctional metacognitive beliefs may play a role in the onset and course of the disorder. Prior studies indicate that individuals experiencing adjustment difficulties frequently endorse negative metacognitive beliefs, including perceptions of uncontrollability, intolerance of uncertainty, and heightened threat awareness, along with excessive attempts to control their thoughts, all of which may impair adaptive coping (14, 16). Similar patterns are observed in trauma-related disorders such as PTSD, where maladaptive beliefs about uncontrollability and a compulsive need for thought control have been associated with symptom severity and chronicity (4). These dysfunctional metacognitive beliefs may be associated with differences in the cognitive processing of distressing events, intensify threat perception, and hinder psychological recovery. Accordingly, the elevated negative metacognitive beliefs identified in the current AD sample underscore the potential relevance of metacognitive-focused interventions within therapeutic strategies (Table 2). Individuals with AD in the current study exhibited significantly higher scores in negative metacognitive beliefs related to uncontrollability, danger, cognitive confidence deficits, and increased efforts in thought control compared to healthy controls (Table 2). These findings reinforce existing evidence that dysfunctional metacognitive processes appear to be associated with psychopathology in stress-related conditions (10). Specifically, heightened beliefs about uncontrollability and danger suggest a reduced capacity to effectively regulate cognitive processes, while excessive attempts at thought suppression can paradoxically increase psychological distress and perpetuate maladaptive coping cycles. These maladaptive metacognitive beliefs—particularly negative beliefs about uncontrollability and danger, a heightened need to control thoughts, and reduced cognitive confidence—may be linked to decreased adaptive flexibility in response to stressors among individuals with AD. Addressing these dysfunctional metacognitive patterns through targeted interventions may enhance therapeutic outcomes and potentially contribute to more favorable clinical results.

The interaction between impulsivity and metacognition identified in the current study provides further insight into the cognitive vulnerabilities underlying AD. Positive beliefs about worry, negative perceptions of uncontrollability and danger, along with increased impulsivity, specifically the lack of premeditation and lack of perseverance, were all found to be closely related (Table 3). This suggests that maladaptive metacognitive beliefs may be linked to greater impulsivity and a higher symptom burden in AD. Similar interactions have been documented in other psychiatric populations, such as individuals with ADHD. In these individuals, impaired metacognitive regulation, cognitive inflexibility, and deficits in monitoring cognitive processes appear to

be associated with elevated impulsivity (9). Although an explicit quantitative relationship between metacognition and impulsivity in ADHD remains insufficiently defined, the current findings highlight the importance of further exploring this interaction within impulsivity-prone populations, including those with AD. The incorporation of interventions that concurrently target impulsivity and maladaptive metacognition may offer clinical benefits and contribute to more effective coping strategies among individuals with AD.

Binary logistic regression analysis further supported the clinical significance of impulsivity and metacognitive variables in AD (Table 4). Lower educational attainment and smoking status emerged as sociodemographic risk factors that significantly predicted group membership. Importantly, higher impulsivity—specifically lack of perseverance—and reduced cognitive confidence were identified as significant cognitive-behavioral predictors (Table 4). These findings highlight that impaired persistence in task-oriented behavior and reduced confidence in one's cognitive abilities may significantly contribute to the risk and clinical severity of AD. Consequently, interventions aimed at enhancing cognitive confidence and reducing impulsivity may offer therapeutic benefits for individuals diagnosed with AD.

We acknowledge several limitations inherent to the current study. First, our sample consisted exclusively of male participants from a single institutional setting, which restricts the generalizability of the findings. In future research, we intend to include more diverse and mixed-gender populations to enhance external validity. Second, due to the cross-sectional nature of our design, causal relationships cannot be inferred. We recognize the need for longitudinal studies to clarify the directionality of the observed associations. Third, all key variables were assessed using self-report instruments, which may have introduced subjective bias. To address this limitation, we plan to incorporate clinician-rated or behavioral assessments in future studies to strengthen objectivity. Fourth, although comorbid psychiatric diagnoses were excluded through structured clinical interviews, we did not apply disorder-specific screening tools for subthreshold ADHD or impulse-control symptoms, which may have influenced the interpretation of impulsivity-related findings. Fifth, a validated Turkish measure of AD severity was not available at the time of data collection, which prevented us from capturing symptom severity using standardized instruments. An additional limitation pertains to the significant difference in educational levels observed between the AD and control groups. Although employment status, serving as an indirect indicator of socioeconomic differences, was similar across groups, we cannot entirely rule out the possibility that differences in educational background may have influenced our results. Future research should ideally select educationally matched control groups to enhance comparability. We also plan to integrate such tools in future studies to improve diagnostic precision and comparability. Lastly, although we statistically controlled for key sociodemographic variables (age, education, marital status, and smoking) using ANCOVA, residual group differences in baseline characteristics may still affect internal validity and limit the generalizability of the findings.

An analysis of sociodemographic factors revealed significant differences in marital status, educational attainment, and substance use, including smoking and alcohol consumption, between the AD and control groups (Table 1). Prior studies have consistently reported that higher levels of education can offer protection against the development of psychopathology, largely by promoting adaptive coping skills and resilience (23, 24). Similarly, substance use, often employed as a maladaptive coping mechanism, has been repeatedly linked to elevated vulnerability to psychiatric conditions due to ineffective stress management strategies (25–28). Thus, our findings substantiate the existing literature and emphasize educational attainment as a protective factor, while reinforcing substance use as a significant risk factor for adjustment-related psychopathology.

CONCLUSION

The present study highlights significant associations between impulsivity and metacognitive beliefs in individuals diagnosed with AD. The findings suggest that heightened impulsivity, particularly lack of premeditation and perseverance, and dysfunctional metacognitive beliefs concerning uncontrollability and the need for thought control are important components contributing to the psychopathology of AD. These results underscore the relevance of impulsivity and metacognitive beliefs in the clinical profile of AD. Future studies may investigate the effectiveness of targeted interventions in improving stress-related outcomes. Future longitudinal

research examining the interaction of impulsivity, metacognition, and sociodemographic factors will be crucial in clarifying the cognitive mechanisms underlying AD. Such studies may inform the development of targeted psychological interventions aimed at reducing impulsivity and enhancing metacognitive regulation.

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Category 1	Concept/Design	T.S.
	Data acquisition	T.S., U.T.
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RESEARCH ARTICLE

The knowledge and attitudes of psychiatrists toward antipsychotic long-acting injections in Turkiye

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ABSTRACT

Objective: Schizophrenia is a chronic psychiatric disorder frequently complicated by nonadherence to oral antipsychotics. Long-acting injectable antipsychotics (LAIA) improve adherence and reduce relapse, yet their use differs across countries. This study examined the knowledge, attitudes, and prescribing practices of psychiatrists in Türkiye regarding LAIA treatments.

Method: A cross-sectional online survey was conducted between March 2024 and March 2025. The questionnaire, distributed to 1,255 psychiatrists, collected sociodemographic data, clinical workload, and responses to 13 attitude statements. A total of 157 psychiatrists completed the survey and met inclusion criteria. Descriptive statistics and chi-square analyses were performed to assess associations between attitudes and demographic or institutional characteristics.

Results: Participants had a mean age of 38 years; 72.6% were female. Most respondents (79.6%) reported routinely considering LAIA therapy. Paliperidone (80.3%) and aripiprazole (47.8%) were the most frequently preferred agents. Positive attitudes were more common among psychiatrists with longer professional experience and those working in institutions with inpatient clinics. More experienced clinicians were significantly less likely to endorse misconceptions, such as the belief that LAIAs limit therapeutic relationships, are costlier than hospitalization, or represent an unpleasant treatment for patients. Attitudes varied across workplace settings: private sector psychiatrists more often expressed caution, particularly regarding first-episode psychosis.

Conclusion: Psychiatrists in Türkiye generally recognize the value of LAIAs beyond nonadherent cases, with professional experience and institutional context shaping prescribing patterns. While favorable attitudes predominate, misconceptions and systemic barriers persist. Targeted education, supportive policies, and shared decision-making strategies may promote wider, evidence-based use of LAIAs in clinical practice.

Keywords: Schizophrenia, long-acting injectable antipsychotics, psychiatrist attitudes, treatment adherence

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INTRODUCTION

Schizophrenia is among the most debilitating psychiatric disorders worldwide, often leading to significant impairment in functioning and quality of life. Antipsychotic agents have been the cornerstone of treatment since the 1950s (1). Although both first-generation (FGA) and second-generation (SGA) antipsychotics are effective for managing acute episodes and preventing relapse, studies show that nearly half of patients (46.6%) relapse within five years (2). Among various treatment strategies, antipsychotics have demonstrated the strongest evidence in preventing relapse (3).

Antipsychotic medications are available in both oral and long-acting injectable antipsychotic (LAIA) forms. LAIAs were first introduced in the 1960s to enhance treatment adherence by providing sustained drug release, thereby allowing for less frequent dosing—typically once or twice a month (4, 5). The first second-generation antipsychotic LAIA formulations became available in the early 2000s.

Compared to their oral counterparts, LAIA forms offer several clinical advantages: improved adherence, reduced relapse and hospitalization rates, delayed and lower risk of relapse following treatment discontinuation, and a clearer distinction between true treatment resistance and nonadherence. Moreover, LAIA use has been associated with lower all-cause mortality compared to oral forms (6). While LAIAs were traditionally reserved as a last-line option, recent studies have demonstrated their advantages in early-phase psychosis, showing that they are generally associated with fewer complications and better overall health outcomes compared to oral antipsychotic treatments (7, 8). In addition, LAIAs help to keep drug levels in the bloodstream stable, minimizing fluctuations that can lead to side effects or reduced efficacy, and may therefore reduce the overall burden of side effects compared to oral formulations.

However, the global utilization of LAIA forms varies widely—from 5.4% to 80%—with prescribing rates influenced by national healthcare policies, sociodemographic characteristics, cultural attitudes, and logistical factors (9–13). Despite generally positive attitudes toward long-acting injectable (LAI) forms among clinicians, some still reserve them for use as a last-line option (13, 14).

Factors influencing LAIA prescription include clinician and patient attitudes, stigma associated with injections, concerns about autonomy, perceived side effects, cost, availability, and, in some countries, the legal framework regarding involuntary outpatient treatment (6, 13). Additionally, some studies have shown that as clinical experience increases, the use of LAIAs becomes more common and clinicians' attitudes toward these treatments tend to become more positive (10, 15, 16).

Given their clinical benefits in enhancing adherence and reducing relapse, LAIAs represent a valuable treatment modality for schizophrenia. Yet, their underutilization in some settings highlights the importance of exploring professional attitudes toward these treatments. This study aims to investigate the current perspectives of psychiatrists working in Turkiye regarding the use of LAIAs. To our knowledge, it is the first study of its kind conducted in the Turkish context. We hypothesized that as professional experience increases, negative perceptions of LAIAs decrease. We also hypothesized that the characteristics of psychiatrists' workplaces—such as the presence of an inpatient clinic—would be associated with higher agreement rates with positive statements regarding the use of LAIAs.

METHODS

Participants were recruited from psychiatrists practicing in Turkiye. Data were collected between March 1, 2024 and March 1, 2025 via an online questionnaire created using Google Forms. The survey link was randomly distributed via professional Yahoo and WhatsApp groups and sent to a total of 1,255 psychiatrists. The invitation stated that participation in the survey was voluntary and that informed consent was obtained from participants. In addition, the email explained the purpose of the survey and included an option to "opt out." Confidentiality was maintained, and no personal information was disclosed to anyone. Participants were not financially compensated for completing the survey.

Sampling Frame

Psychiatry specialization training in Turkiye is provided by university hospitals (excluding those affiliated with the University of Health Sciences), psychiatric training and research hospitals, and psychiatric departments within general training and research hospitals (including both city hospitals and general training and research hospitals, some of which are affiliated with the University of Health Sciences). Following the national medical specialization examination,

physicians undergo a four-year training period in adult psychiatry, culminating in the completion and approval of a medical specialization thesis. Upon successful completion, the title of adult psychiatrist is conferred.

Following graduation, psychiatrists in Turkiye must complete a compulsory service service term of 300 to 600 days in locations assigned by the Ministry of Health. After fulfilling this compulsory service, psychiatrists are eligible to work in state hospitals (non-training institutions), psychiatric departments of training and research hospitals (including city hospitals and general research hospitals, some affiliated with the University of Health Sciences), psychiatric training and research hospitals, university hospitals (excluding those affiliated with the University of Health Sciences), private hospitals, or private clinics. The population of this study includes all adult psychiatrists actively practicing in Turkiye.

Sample Size Calculation

According to the Turkish National Mental Health Action Plan (2021–2023), the estimated number of actively practicing psychiatrists in Turkiye is approximately 6,000 (17). A power analysis was performed using G*Power 3.1 software to determine the minimum required sample size for chi-square tests. Assuming a medium effect size (w=0.3), a significance level of α=0.05, and a power of 80%, the minimum sample size was calculated to be 88 participants.

Inclusion criteria were being a psychiatrist, working as an active clinician, and being between the ages of 28 and 65. Exclusion criteria were ongoing specialization training and the presence of an impediment that precluded participation in the computerized tests.

The research was conducted as a cross-sectional study. The study was approved by the Erenköy Mental and Neurological Diseases Training and Research Hospital Scientific Research Ethics Committee (approval no. 65) on December 30, 2022.

Data Collection Tool

A sociodemographic data form and an LAIA administration attitude form were administered to participants. The questionnaire was designed by the researchers after reviewing the existing literature. The sociodemographic data form included questions on participants' age, gender, institution where they received specialty training, current workplace, and professional experience (categorized as 1–10 years, 11–15 years, and more than 15 years). The questionnaire included both open-ended and multiple-choice questions on the following topics: frequency of use of LAIAs in routine clinical practice, most preferred LAIAs, psychiatrists' perspectives regarding the use of LAIAs, factors affecting their preferences, and opinions on cost, hospitalization, and the experiences of patients and their relatives. Completing the survey required approximately 12 to 14 minutes.

Statistical Analysis

All data obtained during the study were analyzed using IBM SPSS Statistics version 26 software. Power analysis was not performed, as the aim was to reach the entire sample available prior to the study. All data were categorical, except for the age of the participating psychiatrists. Sociodemographic data were expressed as percentages. The chi-square test was applied to compare the propositions used in the questionnaire with other categorical data. The significance level was set at $p<0.05$. In cases where the requirements for the chi-square test could not be met, only percentages were used to compare categorical data.

RESULTS

Sociodemographic Features of the Participants

The survey was administered online and targeted only practicing psychiatrists; those still in specialization training were excluded. Of the 1,255 psychiatrists invited to participate, 157 provided complete responses and met the inclusion criteria. The mean age of the participants was 38.03 years (standard deviation [SD]=6.45), with 114 (72.6%) identifying as female and 43 (27.4%) as male.

Clinical experience was divided into three groups (1–10 years, 11–15 years, and more than 15 years), and the distribution of respondents across these categories is presented in Table 1. Of the participants, 58.6% had completed their specialty training in university hospitals (excluding hospitals affiliated with the University of Health Sciences, which are classified under both city hospitals and general training and research hospitals), 28.7% in psychiatric training and research hospitals, and 12.7% in the psychiatric departments of general training and research hospitals (including both city hospitals and general training and research hospitals).

All participants were actively employed at the time of the study. Of these, 29.3% were working in state hospitals (non-training institutions), 24.2% in psychiatric departments of training and research hospitals (both city hospitals and general training and research hospitals), 14% in psychiatric training

Table 1: Sociodemographic and clinical experience data of the participants

	Values, n (%)
Sex	
Female	114 (72.6)
Male	43 (27.4)
How many years have you been working as a psychiatrist?	
1–10 years	68 (43.3)
11–15 years	71 (45.2)
>15 year	18 (11.5)
Where did you complete your specialized training?	
University Hospital	92 (58.6)
Psychiatric Department of a General Hospital	45 (28.7)
Psychiatric Training and Research Hospital	20 (12.5)
Which hospital are you currently working at?	
State Hospital	46 (29.3)
Psychiatric Training and Research Hospital	38 (24.2)
Psychiatric Department of a Training and Research Hospital	22 (14.0)
University Hospital	14 (8.9)
Private Hospital	14 (8.9)
Private Clinic	23 (14.6)
Is there an inpatient clinic in your institution?	
Yes	72 (45.9)
No	85 (54.1)
Total	157 (100)

Table 2: Clinical workload of psychiatrists in the past month

Question	Range	Mean	SE	SD
During one month, how many patients do you examine on average?	(0–1590)	515.29	29.484	369.431
During one month, how many schizophrenia patients do you examine on average?	(0–500)	70.41	6.762	84.731
During one month, how many patients do you prescribe long-acting injectable antipsychotic (LAIA) treatment to on average?	(0–450)	38.09	5.455	68.349
During one month, how many first-episode psychosis patients do you examine on average?	(0–100)	5.408	0.7794	9.7655
During one month, how many of your patients start LAIA treatment for the first time?	(0–65)	5.835	0.8543	10.7042

SE: Standard error; SD: Standard deviation.

and research hospitals, 8.9% in university hospitals (excluding those affiliated with the University of Health Sciences), 8.9% in private hospitals, and 14.6% in private clinics. More than half of the units where clinicians worked did not have an inpatient clinic (n=157; 54.1%) (Table 1).

Clinical Study Features of the Participants

The monthly clinical workload of the participants, including the total number of patient visits, schizophrenia cases, and LAIA prescriptions, is presented in Table 2.

When psychiatrists were asked which of the LAIAs currently available in Turkiye they most frequently preferred, paliperidone was the top choice (80.3%), followed by aripiprazole (47.8%). Zuclopenthixol was the third most preferred agent (24.8%), while risperidone LAIA was chosen by 18.5% of respondents. The least preferred agent was haloperidol, with a rate of 3.2%.

Psychiatrists' opinions on the use of LAIA treatments, including general recommendations, molecule preferences based on prior oral treatment response,

Table 3: Psychiatrists' opinions on long-acting injectable antipsychotic (LAIA) treatment

Question	Values, n (%)
Does it often occur to you to offer LAI treatment to a patient with schizophrenia?	125 (79.6)
Yes	5 (3.2)
No	27 (17.2)
Sometimes	
Would you recommend the molecule that has benefited the patient in oral form when recommending an LAIA?	97 (61.8)
Yes	1 (0.6)
No	59 (37.6)
Other	
If the patient is receiving first-generation LAIA therapy, would you recommend switching to a second-generation LAIA?	
Yes	65 (41.4)
No	6 (3.8)
Sometimes	86 (54.8)
Total	**157 (100)**

and attitudes toward switching between first- and second-generation LAIAs, are presented in Table 3.

Psychiatrists' Knowledge and Attitudes Toward LAI

This section of the survey included 13 statements about LAIA use, to which participants responded by selecting "Agree," "Neutral," or "Disagree." Some statements were grounded in evidence-based recommendations and reflected current best practices, while others represented common misconceptions or prevailing prejudices surrounding LAIA treatment. Figure 1 presents the overall distribution of responses from all participating psychiatrists, offering a general perspective on attitudes toward LAIA use independent of demographic or institutional variables.

When the relationship between years of professional experience and responses to the survey statements was analyzed, the highest rate of "Agree" responses to the statement, "Regardless of the stage of the disorder, second-generation LAIA treatments should be considered in all patients with schizophrenia" came from participants with 11–15 years of experience (77.5%), compared to lower rates in the group with 0–10 years of experience (50%). Similarly, psychiatrists with more than 11 years of experience gave the highest rate of "Agree" responses to the following statements: "The use of second-generation LAIA treatments to improve treatment compliance may be a reasonable choice in the early phase of treatment in patients with first-episode schizophrenia", "LAIA treatments should be considered in inpatients with proven relapse symptoms, symptoms of severe illness, lack of insight, lack of caregivers, or doubts about medication adherence," and "In schizophrenia patients with substance abuse comorbidity, the use of LAIA treatments is recommended to increase treatment adherence."

Among those who responded "Disagree" to the following statements—which reflect common misconceptions and prejudices—"LAIA prevents the formation of a therapeutic relationship between the patient and the psychiatrist," "LAIA treatment is an unpleasant experience for patients (loss of autonomy, pain, increased symptoms such as skepticism)," "LAIA are more expensive than hospitalization," "Frequent injection visits are very time-consuming for LAIA treatments," and "LAIA treatments should be initiated in centers where close follow-up can be performed (inpatient service, community mental health center, etc.)," psychiatrists with more than 10 years of experience gave "Disagree" responses at significantly higher rates compared to those with less than 10 years of experience (respectively: 100% vs. 39.7%; 100% vs. 38.2%; 100% vs. 76.5%; 85.9% vs. 73.5%; 85.9% vs. 13.2%). However, chi-square analysis could not be performed due to insufficient cell frequencies related to years of professional experience.

Differences were observed in responses to the survey statements based on the participants' workplace settings, particularly between those working in private clinics and those in other institutions. For instance, agreement with statements such as "Regardless of the stage of the disorder, second-generation LAIA treatments should be considered in all patients with schizophrenia," "The use of second-generation LAIA treatments to improve treatment compliance may be

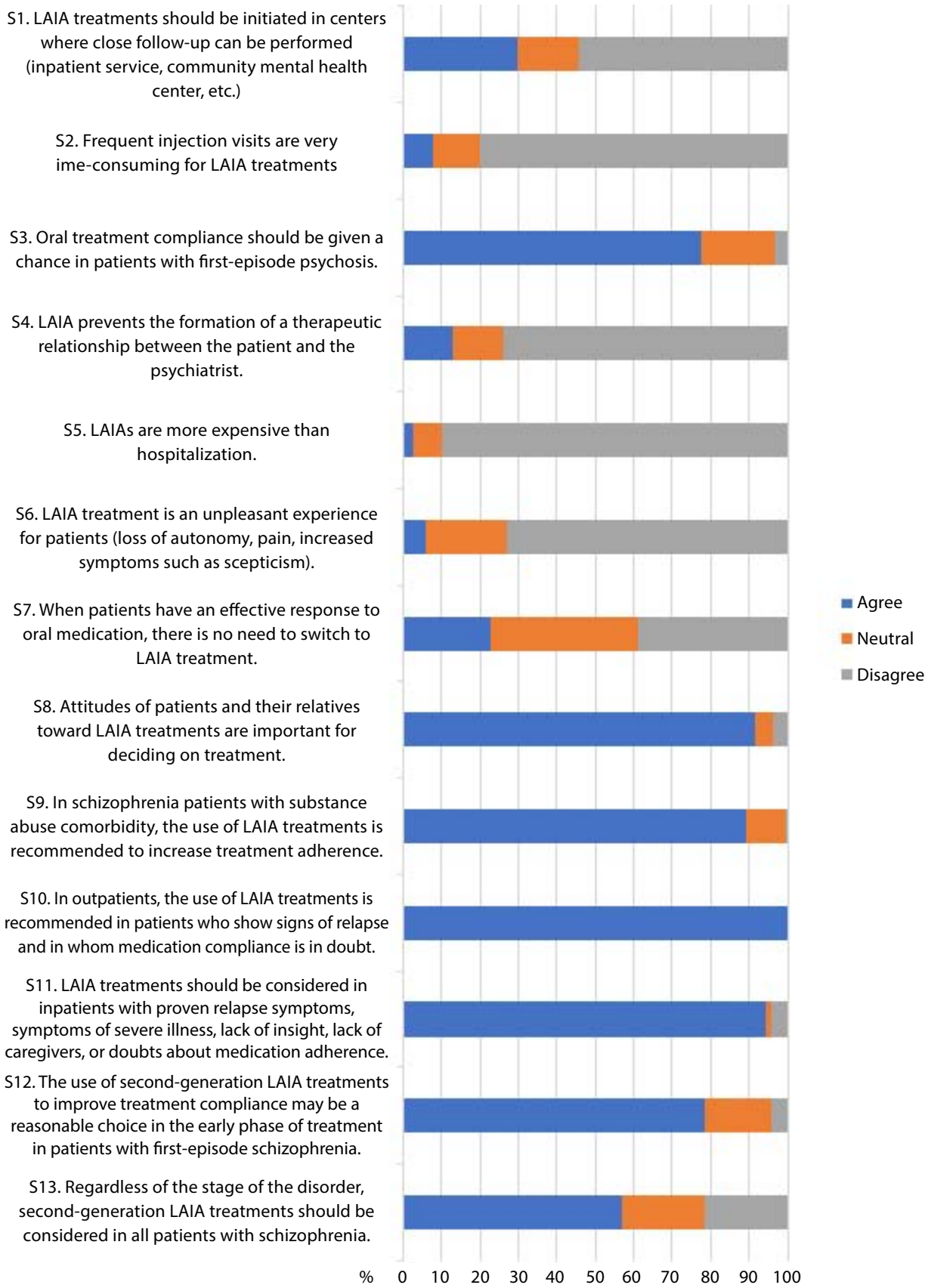

Figure 1. Attitudes of psychiatrists toward statements on long-acting injectable antipsychotic treatment.

Table 4: Comparison of agreement rates based on inpatient clinic availability

Statement	Agreement rate (%) with inpatient clinic	Agreement rate (%) without inpatient clinic
Regardless of the stage of the disorder, second-generation LAIA treatments should be considered in all patients with schizophrenia	80.6	36.5
The use of second-generation LAIA treatments to improve treatment compliance may be a reasonable choice in the early phase of treatment in patients with first-episode schizophrenia.	90.3	68.2
LAIA treatments should be considered in inpatients with proven relapse symptoms, symptoms of severe illness, lack of insight, lack of caregivers, or doubts about medication adherence.	98.6	90.6
In schizophrenia patients with substance abuse comorbidity, the use of LAIA treatments is recommended to increase treatment adherence	98.6	81.2
Attitudes of patients and their relatives toward LAIA treatments are important for deciding on treatment	98.6	85.9

a reasonable choice in the early phase of treatment in patients with first-episode schizophrenia," "LAIA treatments should be considered in inpatients with proven relapse symptoms, symptoms of severe illness, lack of insight, lack of caregivers, or doubts about medication adherence," "In schizophrenia patients with substance abuse comorbidity, the use of LAIA treatments is recommended to increase treatment adherence," and "Attitudes of patients and their relatives toward LAIA treatments are important for deciding on treatment" was lower among participants working in private clinics compared to those in other institutions (respectively: 0% vs. 66.4%; 69.6% vs. 79.9%; 69.6% vs. 98.5%; 95.7% vs. 88.1%; 43.5% vs. 100%). Meanwhile, disagreement with statements such as "When patients have an effective response to oral medication, there is no need to switch to LAIA treatment," "LAIA treatment is an unpleasant experience for patients (loss of autonomy, pain, increased symptoms such as skepticism)", "LAIA treatments are more expensive than hospitalization", "LAIA treatments prevent the formation of a therapeutic relationship between the patient and the psychiatrist", "Oral treatment compliance should be given a chance in patients with first-episode psychosis," "Frequent injection visits are very time-consuming for LAIA treatments", and "LAIA treatments should be initiated in centers where close follow-up can be performed (inpatient service, community mental health center, etc.)" was higher among participants working in private clinics compared to those in other institutions (respectively: 100% vs. 28.4%; 100% vs. 68.7%; 100% vs. 88.1%; 100% vs. 69.4%; 21.7% vs. 0%; 78.3% vs. 80.6%; 78.3% vs. 50%).

When all survey statements were cross-tabulated with the institution where participants received their psychiatry specialization training, notable differences emerged for two statements. Psychiatrists who completed their specialization at psychiatric training and research hospitals were more likely to disagree with the statement "When patients have an effective response to oral medication, there is no need to switch to LAIA treatment" compared to those trained at other institutions. They also showed a significantly higher rate of agreement with the statement "LAIA treatments should be considered in inpatients with proven relapse symptoms, symptoms of severe illness, lack of insight, lack of caregivers, or doubts about medication adherence."

Furthermore, the presence of an inpatient clinic in the participants' institutions was associated with notable differences in response patterns. These differences are presented in Table 4.

DISCUSSION

LAIAs were developed to reduce noncompliance with oral treatment in patients with schizophrenia; however, prescription rates vary widely across countries. This study aimed to explore the current knowledge, attitudes, and prescribing practices of psychiatrists in Turkiye regarding long-acting injectable antipsychotics. The findings revealed that while most clinicians acknowledge the clinical value of LAIAs and hold generally positive views toward their use, certain misconceptions and variations in prescribing patterns persist, shaped by factors such as clinical experience, institutional setting, and work environment.

This study included responses from 157 psychiatrists, a sample size comparable to previous surveys conducted in regions such as Europe, France, Croatia, Japan, and South Africa (18–22). The majority

of participants in our study were within the first 15 years of their professional careers, indicating a relatively early-career sample. Compared to studies from Europe and Japan, where the average duration of psychiatric experience tends to be higher, our sample reflects a younger and potentially more adaptive group of clinicians (20, 21).

Clinical Study Features of the Participants

Participants reported seeing an average of 515.29 patients per month, prescribing long-acting injectable antipsychotics to approximately 7.4% of them. This indicates that LAIAs are selectively used in a subset of psychiatric patients in routine clinical practice. However, it should be noted that the survey question did not specifically ask how many patients with schizophrenia received LAIA prescriptions. Therefore, this proportion reflects the overall number of LAIA prescriptions among all patients seen monthly, regardless of diagnosis. This may have led to variability in interpretation among participants and should be considered when comparing with studies focused solely on schizophrenia populations. Still, this proportion appears comparable to or slightly lower than those reported in some international studies. For instance, the European ALTO study (Attitudes towards Long-acting injectable antipsychotics for the Treatment of Schizophrenia) highlighted growing clinician acceptance of LAIAs, although prescription rates varied widely by country depending on healthcare policies and the availability of second-generation formulations (21). In France, prescription rates were as low as 5.4% (15), while a study from Australia reported a higher rate of 13% (23). Similarly, Gundugurti et al. (24) found that 9% of chronic schizophrenia patients in India received LAIA treatment, with barriers such as cost and conservative prescribing practices influencing uptake. Compared to these figures, the 7.4% LAIA prescription rate observed in our study suggests a moderate level of use in Turkiye, reflecting both clinical caution and contextual influences such as health system structure and prescribing norms.

In line with recent European findings reporting increased prescription rates of second-generation LAIA formulations, largely attributed to their growing availability (21), paliperidone emerged as the most preferred long-acting molecule among clinicians in our study, followed by aripiprazole. This preference may reflect evolving trends in clinical practice in Turkiye, potentially influenced by increased availability and familiarity with SGA LAIAs. In Turkiye, both first-generation and second-generation LAIAs are fully covered by the national health insurance system. Therefore, psychiatrists' prescribing decisions are unlikely to be constrained by issues of financial accessibility or reimbursement. Unusually, in contrast to both European and Turkish trends, a study from India reported higher use of FGA LAIAs, primarily due to cost-related considerations (13). However, this finding should be interpreted with caution, as the range and availability of first-generation LAIA formulations in India are considerably broader than in Turkiye. The wider accessibility of these formulations in the Indian market likely contributes to this distinct prescribing pattern.

Although risperidone is a second-generation antipsychotic, its long-acting injectable formulation is less preferred than that of zuclopenthixol. This may be attributed to its side effect profile at higher doses, which resembles that of first-generation LAIAs, as well as the practical challenges associated with its storage requirements. Furthermore, the need for concurrent oral supplementation during the initiation phase and the delayed release of its active metabolite after the first injection may further limit its use. Given that risperidone's active metabolite is paliperidone, many clinicians may prefer the latter, which offers a more favorable pharmacokinetic profile and a simpler dosing regimen.

Approximately half of the participants in our study stated that they routinely consider switching from a first-generation LAIA to a second-generation LAIA, while the remaining half reported doing so occasionally, depending on the clinical context. These findings suggest that psychiatrists in Turkiye approach LAIA treatment with a degree of flexibility, tailoring their decisions to individual patient needs. In a study conducted by Grover et al. (13) in India, switching decisions were primarily driven by pragmatic concerns, including treatment cost, side effect burden, and patient adherence. Similarly, Roopun et al. (25) reported that psychiatrists in South Africa demonstrated a greater willingness to switch to second-generation LAIAs, particularly when such transitions were aligned with improved patient acceptability and engagement.

When evaluated alongside international findings, the data from Turkiye reveal a consistent pattern regarding the influence of professional experience on psychiatrists' attitudes toward LAIA use. In our study, clinicians with 11-15 years of experience showed the highest levels of agreement with evidence-based

statements, including the recommendation of LAIAs across all illness stages, as well as in early psychosis, relapse, and substance use comorbidity. Furthermore, psychiatrists with over 10 years of experience were less likely to endorse common misconceptions—such as concerns about patient autonomy or disruption of the therapeutic relationship—indicating a reduced susceptibility to LAIA-related prejudice. These findings suggest that increased clinical experience may foster greater confidence and competence in prescribing LAIAs, encouraging their broader and more appropriate application. Supporting this interpretation, Patel et al. (21) reported that openness to LAIA use was positively associated with the influence of experienced colleagues who held favorable views of these treatments, highlighting the potential role of peer modeling in shaping prescribing behavior.

Notably, in that study, most participants had an average of 20 years of professional experience and reported increased use of LAIAs in recent years, often attributing this change to growing confidence and a sense of ease in managing these treatments. Interestingly, a study from Japan (20) found that more senior psychiatrists were actually less likely to initiate LAIAs in cases of first-episode schizophrenia, suggesting that without continued education and exposure to evolving practices, clinical habits may become more conservative over time. In contrast, our findings in Turkiye point to a more encouraging trend. This openness may reflect positive shifts in psychiatric training, greater access to updated clinical guidelines, and a growing culture of adaptability in mental healthcare. Rather than being shaped solely by tradition or seniority, prescribing practices in this group seem to be guided by curiosity, evolving evidence, and a genuine desire to improve patient outcomes.

Psychiatrists' Knowledge and Attitudes About LAIA

In our survey, some of the statements reflected evidence-based knowledge about LAIA use, while others were based on common misconceptions that may still influence clinical decision-making. When these attitudes were examined across variables such as professional experience and work setting, meaningful patterns emerged. These contextual factors appear to shape psychiatrists' approaches—sometimes reinforcing accurate information, and at other times reflecting lingering doubts or cautious attitudes.

While some of these trends mirror findings from international literature, others point to context-specific dynamics within Turkiye's mental health landscape. In the following sections, each statement will be discussed in more detail—going beyond simple reporting of agreement rates to explore the possible clinical, institutional, and cultural factors that may explain these preferences.

Those with 11-15 years of clinical practice were significantly more inclined to recommend starting LAIA treatment in facilities offering intensive follow-up. This finding is in line with Samalin et al. (22), who reported that experienced psychiatrists in France viewed LAIAs not only as a solution for noncompliance but also as part of a broader clinical management strategy. The European ALTO study further showed that positive attitudes toward LAIAs increased with clinical experience, supporting the idea that experienced clinicians may prefer settings where close monitoring is possible during initiation (21). Roopun et al. (25) similarly noted that infrastructure enabling follow-up plays a key role in LAIA decisions. One explanation may be that mid-career psychiatrists often assume greater responsibility for treatment safety and monitoring.

In our study, clinicians working in the private sector (both private clinics and hospitals) more frequently agreed that frequent injection visits make LAIA treatment time-consuming. However, this perception contrasts with findings from previous research. Arango et al. (26) reported that most psychiatrists did not find LAIA administration to significantly extend treatment duration; rather, they viewed it as an opportunity for structured follow-up and therapeutic continuity. Similarly, in a study by Schreiner et al. (27), regular injection visits were found to support both pharmacological adherence and psychiatric stability, contributing to fewer crisis-based healthcare contacts. The responses from private-sector clinicians in our study may reflect context-specific challenges, such as tighter scheduling demands, limited infrastructure for administering injections, or patient flow dynamics particular to private practice. In Turkiye, this perception may also be shaped by the organizational realities of private psychiatric services, where shorter consultation times, appointment-based workflows, and limited ancillary support staff may make the logistics of regular intramuscular injections less feasible in routine practice. These structural factors may create the impression that LAIA use is more time-intensive than oral treatment, even when clinical benefits are acknowledged.

Participants working in private clinics more frequently supported giving oral treatment a chance

in patients experiencing first-episode psychosis, suggesting a preference for oral strategies during the early stages of illness within this subgroup. While this may reflect an approach that respects patient autonomy and prioritizes shared decision-making, contextual factors specific to Turkiye must also be considered. These include reimbursement policies requiring approval by three psychiatrists for prescribing second-generation LAIAs and the relatively high cost of these medications. To our knowledge, there is no prior literature directly comparing attitudes in private clinics versus state hospitals regarding early-phase LAIA use. Therefore, our findings offer a preliminary perspective that may guide future research on setting-related prescribing patterns.

Rejection of the belief that LAIA treatment hinders the development of a therapeutic relationship between the patient and psychiatrist increased with years of clinical experience in our study. This suggests that the misconception may diminish over time as clinicians gain more confidence in long-acting treatment models and observe their real-world outcomes. Supporting this, a study conducted in Croatia found that 68% of psychiatrists believed the patient- psychiatrist relationship was actually better under LAIA treatment, primarily due to the increased structure and predictability of care (19). LAIA administration often facilitates regular contact and follow-up, which can foster trust and therapeutic continuity. In Turkiye, the increased rejection of this misconception among more experienced clinicians may reflect a growing appreciation of how structured, regular follow-up enabled by LAIA use can strengthen—rather than weaken—the therapeutic alliance. Rather than viewing depot formulations as distancing, experienced Turkish psychiatrists may increasingly see them as tools to sustain clinical engagement over time.

The misconception that LAIA treatments are more expensive than hospitalization was less common among psychiatrists with more than 10 years of clinical experience in our study. This may reflect a more nuanced understanding of healthcare economics acquired over time. In fact, multiple U.S.-based economic models have demonstrated that although LAIAs incur higher upfront pharmaceutical costs, they significantly reduce overall expenditures by lowering relapse-related hospitalizations and emergency care needs (16, 28). Some studies even suggest that early implementation of LAIA treatment—particularly in first-episode schizophrenia—may be a cost-effective strategy when broader health system outcomes are considered (29, 30). In Turkiye, where the psychiatric healthcare system faces both resource constraints and increasing caseloads, the stronger endorsement of this cost-related insight by experienced psychiatrists may indicate an evolving clinical perspective: one that prioritizes long-term functional outcomes and system efficiency over short-term cost considerations. This shift could signal growing awareness of the hidden economic burden of recurrent hospitalizations and the value of preventative strategies such as early LAIA initiation.

The view that LAIA treatment is an unpleasant experience for patients—due to factors such as perceived loss of autonomy, injection-related pain, or increased skepticism—reflects one of the most persistent prejudices against long-acting formulations. In our study, disagreement with this statement was notably higher among clinicians with 10 or more years of experience, suggesting that increased clinical exposure and familiarity with patient outcomes may help dispel such biases over time. Supporting this, Arango et al. (26) noted that negative patient attitudes toward LAIAs often stem from insufficient information or previous adverse experiences, and that these attitudes can be reshaped through effective communication and counseling. In contrast, clinicians working in private clinics in Turkiye were more likely to agree with this perception. This may be influenced by the unique dynamics of private psychiatric clinic practice, where treatment choices are often shaped by patient preference, heightened concern for therapeutic rapport, and sensitivity to perceived coercion or discomfort associated with injectable treatments.

In our study, psychiatrists who disagreed with the view that patients responding well to oral medication do not need to switch to LAIA therapy were predominantly those with greater clinical experience. This trend suggests that clinical seniority may increase awareness of the long-term advantages of LAIAs. A similar pattern was observed among those trained in psychiatric training and research hospitals or general training and research hospitals, compared to those trained in university hospitals. Additionally, psychiatrists working in settings without inpatient services were more likely to reject this view, possibly reflecting a stronger emphasis on treatment continuity in outpatient care. Previous studies have shown that hesitation to recommend LAIA therapy in adherent patients is a common concern. For instance,

psychiatrists in France and Japan often perceived LAIAs as unnecessary when oral compliance was considered adequate (20, 22). However, this conservative approach has been criticized for overlooking the fragile and context-dependent nature of adherence to oral medication. Guidelines such as those from the National Institute for Health and Care Excellence (NICE) emphasize that, even when patients respond well to oral treatments, LAIAs should still be discussed during shared decision-making due to their protective role against relapse (31). In Turkiye, the diversity of views observed across institutions and levels of experience suggests that attitudes toward LAIA use are shaped not only by clinical outcomes but also by differences in training culture, service structure, and perceptions of patient monitoring needs.

In our study, the majority of participants agreed with the statement that the attitudes of patients and their relatives towards LAIA treatments are important when deciding on treatment. This underscores the increasing emphasis placed on shared decision-making and the value of patient and caregiver perspectives in psychiatric care. In the Nigerian study by James et al. (32), it was reported that patients' and families' perceptions of injectable treatment could significantly influence psychiatrists' prescribing decisions. Likewise, in a large-scale study conducted in Spain, Arango et al. (26) noted that regional differences in LAIA use were shaped not only by healthcare policies but also by the attitudes of patients, their families, and professionals involved in care. These findings align with internationally accepted frameworks such as the NICE guidelines, which prioritize collaborative, patient-centered treatment planning (31). The results of the present study indicate that Turkish psychiatrists also value the role of patients and caregivers in treatment decisions, reflecting a shift toward more participatory clinical practice models.

The statement that LAIA treatments are recommended to improve adherence in schizophrenia patients with comorbid substance use received a high level of agreement. This suggests that psychiatrists in Turkiye consider LAIAs not only to address noncompliance but also as part of a broader clinical strategy in complex cases. Previous studies have reported that switching to LAIAs in such patients improves adherence and reduces both emergency department visits and hospitalizations (25, 33). Similarly, in a Nigerian study, nearly half of the psychiatrists viewed LAIA use as clinically necessary in patients with a history of substance abuse (32). The strong support observed in our sample implies that Turkish psychiatrists recognize the multidimensional benefits of LAIA use in dual-diagnosis patients—not only in improving clinical stability but also in potentially reducing the burden on healthcare services.

All participants agreed that LAIA treatment should be recommended for outpatients who show signs of relapse and whose medication adherence is in doubt. This consensus highlights that impaired adherence remains one of the most universally accepted indications for LAIA use across different treatment settings. Supporting this, Grover et al. (13) reported that in India, poor adherence was the most common reason for initiating LAIA therapy, particularly in outpatient populations. The complete consensus in our sample indicates that Turkish psychiatrists view medication noncompliance as one of the most decisive factors guiding LAIA use in outpatient care.

There was a high level of agreement among participants with the statement that LAIA treatments should be considered for inpatients presenting with relapse, severe symptoms, poor insight, lack of caregiver support, or suspected nonadherence, reflecting adherence to classical indications for LAIA use. This view was more commonly expressed by those trained in psychiatric training and research hospitals and those currently working in inpatient clinics, suggesting that clinical experience in structured settings may shape familiarity with LAIA indications. In the European ALTO study, Patel et al. (21) reported that LAIAs were more frequently used in patients with prior hospitalizations, reflecting similar practice trends. Likewise, Oguchi et al. (20) noted that Japanese psychiatrists were more likely to recommend LAIAs in cases involving severe illness or poor insight, despite general hesitancy about their use in early phases. Lin et al. (28) also confirmed that LAIAs are more commonly prescribed in the U.S. to patients with severe schizophrenia and poor adherence. Considering the relationship between LAIA use and oral treatments in terms of higher compliance, fewer relapses, and fewer suicide attempts, it has been reported that the use of second-generation antipsychotic LAIAs is more appropriate for individuals with severe schizophrenia (34). In the current study, the strong agreement among Turkish psychiatrists with classical indications—such as severe illness, relapses, and lack of insight—suggests a cautious and clinically grounded approach. Rather than using LAIAs broadly, Turkish psychiatrists appear to reserve them for high-risk cases where the clinical need is most apparent.

Turkish psychiatrists widely endorsed the idea that second-generation LAIAs can be a reasonable option to improve treatment adherence during the early stages of first-episode schizophrenia. This is consistent with current literature, including meta-analyses showing that LAIAs reduce relapse and improve adherence in first-episode patients compared to oral formulations (16). This openness to early intervention may reflect growing familiarity with second-generation LAIA formulations and increased awareness of long-term outcomes. In contrast, Oguchi et al. (20) reported that most Japanese psychiatrists remained hesitant about initiating LAIAs at first episode, possibly due to cultural conservatism or systemic prescribing norms. Similarly, while U.S.-based data confirm the benefits of early LAIA use, actual clinical uptake remains limited, often due to payer systems and infrastructure barriers (28). While openness to early LAIA use appears to be increasing, particularly in first-episode cases, classical indications still represent the main rationale for most prescribing decisions in inpatient settings.

The view that second-generation LAIAs should be considered at all stages of schizophrenia was more commonly endorsed by psychiatrists with more than 11 years of experience. This finding aligns with international literature suggesting that clinical experience is associated with a broader, more proactive view of LAIA use. For example, Samalin et al. (22) reported that experienced clinicians in France perceive LAIAs not only as a solution to nonadherence but also as a general management strategy. Likewise, the European ALTO study showed increasing support for LAIAs with greater seniority (21). However, studies from countries like the USA continue to show a more limited approach, with clinicians often reserving LAIA use for severe or noncompliant cases (16). In contrast, the responses in our study indicate that Turkish psychiatrists—particularly those with moderate experience—are more open to early and comprehensive use of LAIAs. This may reflect changes in psychiatric training curricula, increasing availability of second-generation LAIA formulations, or shifting clinical priorities toward relapse prevention in Turkiye's evolving mental health system.

This study has limitations that should be taken into account. The data were collected through an online survey with voluntary participation, which may have introduced a self-selection bias. The survey invitation was distributed to approximately 1,255 psychiatrists via professional scientific communication channels, as noted in the Methods section. Psychiatrists who are more knowledgeable about or interested in LAIA treatments may have been more likely to respond. Although the sample size (n=157) is comparable to those of similar studies conducted internationally, it represents only a small portion of psychiatrists currently practicing in Turkiye. Additionally, the study did not collect data on the geographical distribution of participants; therefore, it was not possible to analyze potential differences between rural and urban clinical practices. This limits the ability to assess regional trends in LAIA prescribing behavior. The findings should thus be interpreted with caution, and future studies with randomized or stratified sampling methods that include geographical representation are recommended to enhance generalizability.

Despite these limitations, the findings of this study hold significant value in informing future practice. They not only reflect current prescribing preferences and attitudes toward LAIA treatments among psychiatrists in Turkiye but also offer valuable insights into broader clinical practices and future interventions. Understanding clinicians' beliefs and hesitations allows for the development of targeted educational programs that can address misconceptions and promote evidence-based use of LAIAs. In the long term, revealing such attitudinal patterns can help inform national mental health policies, optimize resource allocation, and ensure that patients receive timely and effective treatment. Moreover, highlighting the influence of professional experience and training background can guide future curricula and continuing medical education strategies to support more consistent and guideline-aligned prescribing practices across institutions.

CONCLUSION

This study comprehensively reveals the knowledge, attitudes, and clinical practices of practicing psychiatrists in Turkiye regarding LAIA treatments. The results show that the majority of Turkish psychiatrists consider LAIAs an important treatment option not only for noncompliant patients but also for different clinical presentations. The positive attitude toward LAIA treatment is particularly notable among cases involving first-episode patients and those with comorbid substance use disorders.

The study also found that length of clinical experience, gender, institution of the specialization training, and healthcare system of employment were determinants of LAIA preferences. It is assumed that as experience increases, prejudice against LAIAs decreases and these treatments are evaluated more holistically within a patient-centered framework.

However, it should be noted that some structural limitations, such as the need for approval from three psychiatrists for a drug report or high medication costs, may still influence clinical decisions.

The majority of participants adopted a collaborative decision-making approach that emphasized the attitudes of patients and their families, suggesting that a patient-centered approach is gaining strength in modern psychiatric practice. In addition, scientific evidence that LAIAs contribute to cost-effectiveness by reducing hospital admissions is increasingly being factored into clinical decision-making.

In conclusion, psychiatrists' attitudes in Turkiye are broadly aligned with international trends, though context-specific challenges remain. Future research should investigate the perspectives of both patients and caregivers to better understand barriers and facilitators to LAIA uptake. In addition, qualitative and longitudinal studies exploring the impact of training, healthcare infrastructure, and policy changes on prescribing behavior would offer valuable insights. Developing targeted educational and policy initiatives could help address misconceptions and promote evidence-based, equitable use of LAIAs across diverse clinical settings.

Ethical Approval: The University of Health Sciences, Erenkoy Training and Research Hospital for Psychiatry and Neurological Diseases, Department of Psychiatry Scientific Research Ethics Committee granted approval for this study (date: 30.12.2022, number: 65).

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RESEARCH ARTICLE

The effect of impoverishment of thought in early psychosis: Influence on suicide risk via depression and aggression

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ABSTRACT

Objective: Suicide is a leading cause of premature mortality among individuals with psychosis, particularly during its early stages. This study aimed to examine the direct and indirect effects of formal thought disorders (FTDs) on suicidal ideation and behavior in early psychosis, while also evaluating the roles of depressive symptoms and social functionality as both independent contributors to suicide risk and potential mediators of the relationship between FTDs and suicidality.

Method: The study included 64 patients diagnosed with early psychosis (≤12 months since initial treatment), 30 of whom had recently attempted suicide. Participants were assessed using the Columbia Suicide Severity Rating Scale (C-SSRS), Thought and Language Index (TLI), Personal and Social Performance Scale (PSP), Calgary Depression Scale for Schizophrenia (CDSS), and the Positive and Negative Syndrome Scale (PANSS).

Results: Patients with a history of suicide attempts scored significantly lower on the TLI-Impoverishment of Thought Subscale (TLI-ITS) ($p=0.001$), and significantly higher on the TLI-Disorganization Subscale ($p=0.036$), the CDSS ($p<0.001$), and the PANSS Positive Subscale ($p=0.003$). They also had significantly lower total PSP scores ($p<0.001$). Mediation analysis revealed that the effect of TLI-ITS on suicide attempts was negative and significantly mediated through both CDSS and the Personal and Social Performance Scale – Dysfunction subscale (PSP-D). Lower TLI-ITS scores were associated with higher CDSS scores and lower PSP-D scores, each of which contributed to an increased risk of suicide attempts ($p<0.001$ and $p=0.026$, respectively).

Conclusion: The prominence of impoverishment of thought may be associated with lower levels of depressive symptoms and increased disruptive and aggressive behaviors, which, in turn, could be linked to a reduced risk of suicidal thoughts and attempts. These findings could serve as an important point of consideration for clinicians when assessing suicidal ideation and behavior in early psychosis.

Keywords: Aggression, depressive symptoms, early psychosis, formal thought disorders, social functionality, suicide

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INTRODUCTION

Suicide is a leading cause of premature mortality among individuals with schizophrenia spectrum disorders (1, 2). The incidence of suicide in this population is reported to be up to 20 times higher than in the general population (3), with as many as 5.6% of patients dying by suicide (4). The risk of suicide varies throughout the course of the illness (5), peaking in the early stages, particularly around the initial psychotic episode (6). Notably, patients experiencing their first episode of psychosis are at the greatest risk of dying by suicide within the first 12 months following diagnosis (5). Identified risk factors for suicide attempts include young age, male gender, alcohol and substance use, early stage of illness, depression, psychotic symptoms, previous suicide attempts, and a family history of psychiatric disorders (5, 7–10). Additionally, biological factors such as inflammation and alterations in amygdala and hippocampal volumes are considered potential suicide risk factors (11, 12).

Formal thought disorders (FTDs) are considered one of the core features of schizophrenia, present in approximately 80-90% of patients during acute episodes (13). Although most commonly associated with schizophrenia, FTDs are recognized as a multidimensional phenomenon not specific to any single psychiatric diagnosis. They can also be observed in other schizophrenia spectrum disorders, as well as in mania, depression, and various other psychiatric conditions (14–17). FTDs involve disturbances in the logical organization and sequencing of thoughts, which manifest as abnormalities in the content and form of speech, such as disorganized speech, peculiar thought content, and illogical expressions (18). Longitudinal studies suggest that persistent FTDs following a first psychotic episode are associated with poor prognosis, higher relapse rates, treatment resistance, and eventual conversion to schizophrenia (19–21). Moreover, their presence in individuals at ultra-high risk for psychosis has been shown to predict transition to overt psychotic disorders. (22). Andreasen's classification divides FTDs into positive (e.g., incoherence, peculiar word use, distractibility) and negative (e.g., reduced speech volume and content) subtypes (23,24). While positive FTDs may improve with antipsychotic treatment, negative FTDs tend to persist and are more strongly associated with long-term functional impairment (25–27). Furthermore, chronic FTDs have been linked to persistent positive symptoms and reduced social functionality (28, 29). Considering all this evidence, impoverished or disorganized thought processes may hinder problem-solving abilities and emotional regulation, thereby exacerbating feelings of hopelessness and contributing to suicidal ideation and behavior. For this reason, FTDs hold clinical importance not only in the diagnostic and prognostic assessment of schizophrenia but also in clarifying their potential role in increasing suicide risk, particularly in the early stages of the illness.

Psychosis significantly affects an individual's social, psychological, and occupational functioning, even when psychotic symptoms are managed with psychopharmacological treatment (30). Impaired social functionality is a prominent and chronic symptom of schizophrenia and often presents greater challenges than positive symptoms for many patients (31). Studies suggest that fewer than 50% of individuals with psychosis achieve social recovery (32, 33). A meta-analysis by Marggraf et al. (34) demonstrated an inverse relationship between FTDs and social functioning. Moreover, Robinson et al. (35) reported that poor functioning at the onset of treatment in patients with first-episode psychosis is associated with an increased risk of suicide attempts.

Current data indicate that comorbid depression is common during the prodromal, acute, and post-psychotic phases in patients with schizophrenia. Approximately 80% of individuals with psychosis experience depression at least once over the course of the illness (6). Depression has been reported in 70% of patients with first-episode psychosis during the acute phase and in 36% during the post-psychotic phase (36). Patients with first-episode psychosis who exhibit depressive symptoms are at increased risk of suicide during the follow-up period (37).

While suicide attempts remain a serious and ongoing risk among patients with psychosis, detecting this risk within mental health services is often challenging, and treatment approaches are frequently inadequate. Therefore, identifying suicide risk factors in this population is crucial for guiding the development and implementation of effective interventions. Although suicidality has been studied in the broader context of psychotic disorders, few studies have specifically focused on early psychosis, a clinically distinct period marked by heightened suicide risk. Moreover, the role of FTD subtypes in suicide attempts has rarely been explored in this population. The present study aimed to investigate both the direct and indirect effects of FTDs on suicidal

ideation and behavior in early psychosis, while also evaluating the roles of depressive symptoms, social functioning, and disease severity as both independent contributors to suicide risk and potential mediators of the relationship between FTDs and suicidality. By examining the potential mediating roles of depressive symptoms and social functioning, this study aims to address gaps in the literature and provide insight into the mechanisms linking FTDs to suicidality in early psychosis. We hypothesized that, in patients with early psychosis: (I) FTDs would be more prominent, (II) depressive symptoms would be more severe, (III) social functioning would be lower, and (IV) disease severity would be higher among those with a history of suicide attempts compared to those without.

METHODS

Participants

Patients who were admitted to the psychiatric outpatient clinic or hospitalized at Bakırköy Prof. Dr. Mazhar Osman Mental Health and Neurological Diseases Training and Research Hospital, and diagnosed with Brief Psychotic Disorder, Schizophreniform Disorder, Schizophrenia, Other Specified Schizophrenia Spectrum and Other Psychotic Disorder, or Unspecified Schizophrenia Spectrum and Other Psychotic Disorder according to DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition) criteria, were included in the study. Patients were considered to be in the early phase of psychotic disorder if they were within 12 months of receiving their first treatment for psychotic symptoms. While no universally accepted threshold exists for early psychosis, our definition aligns with prior research indicating that the risk of suicide is extremely high during this period (3, 5, 38). Therefore, the 12-month cut-off reflects a clinically meaningful timeframe that captures the critical window for suicide prevention in individuals newly diagnosed with a psychotic disorder. Exclusion criteria included patients younger than 18 or older than 65 years of age; those with comorbid psychiatric diagnoses, defined as any current or past DSM-5 Axis I disorder other than the diagnoses specified in the inclusion criteria; those with any current physical or neurological disease that could interfere with psychiatric assessment; and individuals with a current or lifetime substance or alcohol use disorder (excluding nicotine), based on clinical interviews and medical records. Patients who had received electroconvulsive therapy (ECT) within the past six months, those who had received antipsychotic treatment for more than 12 months, or those with clinically significant cognitive impairment (e.g., intellectual disability or observable deficits in attention or memory that could affect participation), as determined by a prior diagnosis or clinician's judgment, were also excluded. The sample size for this study was determined a priori using G*Power version 3.1.9.2, with an assumed effect size of 0.8, α=0.05, and power=0.85.

The final cohort comprised 64 patients with early psychosis, including 34 who had not attempted suicide and 30 who had attempted suicide within the past three months. The inclusion of patients who had attempted suicide within this timeframe aligns with the Columbia Suicide Severity Rating Scale's reference period for assessing suicidal behavior.

Procedures

Informed verbal and written consent was obtained from all patients. Sociodemographic and clinical data were collected using a structured form developed by the researchers, and additional clinical data were gathered using the assessment tools described below. Ethical approval was granted by the Ethics Committee of the hospital where the study was conducted (Protocol No. 364, dated 01.10.2019).

Data Collection Tools

Assessment of Suicidal Thoughts and Behaviors

The Columbia Suicide Severity Rating Scale (C-SSRS) is a semi-structured, interview-based assessment tool designed to evaluate suicidal ideation, the intensity of suicidal ideation, and suicidal behavior. Unlike conventional approaches that treat suicidal ideation and behavior as a one-dimensional phenomenon, this scale conceptualizes them as part of a broader spectrum, encompassing passive thoughts, active intent, and behavior. The "Suicidal Ideation" (SI) section consists of five items that assess suicidal ideation as a continuum, ranging from a wish to be dead to a specific suicide plan or intent. The "Intensity of Ideation" (IoI) section explores factors such as frequency, duration, control, deterrents, and underlying reasons for ideation. The "Suicidal Behavior" (SB) section is structured nominally and assesses actual, interrupted, and aborted suicide attempts, predisposing factors, and non-suicidal self-injurious behaviors. Additionally, the scale includes items evaluating the actual or potential lethality of suicide attempts. The C-SSRS assesses both lifetime and current suicidality, with reference periods of the past month for ideation and

the past three months for behavior, depending on clinical conditions or study requirements. The original version demonstrated acceptable internal consistency (Cronbach's alpha=0.73) (39). The validity and reliability of the Turkish version for adolescents were reported with ordinal alpha coefficients of 0.89 and 0.91 for recent and lifetime scores, respectively (40).

Assessment of Formal Thought Disorders

The Thought and Language Index (TLI) is a semi-structured clinical interview scale developed to assess FTDs under standardized conditions. The Impoverishment of Thought (TLI-ITS) subscale includes the following items: poverty of speech, weakening of goal, and perseveration. The Disorganization of Thought (TLI-DTS) subscale includes looseness, peculiar word use, peculiar sentence structure, peculiar logic, and distractibility. In the original study, interrater reliability (intraclass correlation coefficient, ICC) was reported as 0.88 for the impoverished thought/language subscale and 0.82 for the disorganized thought/language subscale (21). The validity and reliability of the Turkish version were established by Ulas et al. (41) Interrater reliability was reported as r=0.97 for the impoverishment of thought subscale and r=0.72 for the disorganization of thought subscale. Test-retest reliability was reported as r=0.78 for the impoverishment of thought subscale and r=0.44 for the disorganization of thought subscale. The TLI also demonstrated strong discriminative validity, successfully distinguishing patients from healthy controls ($p<0.001$).

Assessment of Social Functionality

The Personal and Social Performance Scale (PSP) is a six-point Likert-type assessment tool that evaluates four functional domains: socially useful activities, personal and social relationships, self-care, and disturbing and aggressive behaviors. The total score ranges from 1 to 100, with higher scores indicating better functioning. Test-retest reliability for the PSP was reported as 0.79 (30). Validity and reliability for the Turkish population were confirmed by Aydemir et al. (42) The Cronbach's alpha coefficient was calculated as 0.83, and inter-rater reliability was found to be 0.973.

Assessment of Depressive Symptoms

The Calgary Depression Scale for Schizophrenia (CDSS) is a semi-structured instrument developed to assess depressive symptoms in individuals with schizophrenia, independent of positive, negative, or extrapyramidal symptoms. A total score of 7 or above is predictive of moderate to severe depressive episodes, with a specificity of 82% and a sensitivity of 85%. The original version demonstrated good inter-rater reliability (ICC=0.895) and internal consistency (Cronbach's alpha=0.79) (43). The validity and reliability of the Turkish version were confirmed by Oksay et al. (44), who reported high internal consistency (Cronbach's alpha=0.90), inter-rater reliability (kappa=0.87-1.00), and test-retest reliability (r=0.95-1.00).

Assessment of Symptom Severity

Symptom severity was assessed using the Positive and Negative Syndrome Scale (PANSS), developed by Kay et al. (45) Among the 30 items on the scale, seven assess positive symptoms, seven assess negative symptoms, and 16 assess general psychopathology. In the original study, the alpha coefficients were reported as 0.73 for the positive scale, 0.83 for the negative scale, and 0.79 for the general psychopathology scale. Validity and reliability for the Turkish population were established by Kostakoğlu et al. (46), who reported Cronbach's alpha values of 0.75, 0.77, and 0.71 for the positive, negative, and general psychopathology subscales, respectively.

Statistical Analyses

Data were analyzed using IBM SPSS version 22.0. The conformity of the variables to a normal distribution was assessed using both analytical methods (skewness, kurtosis values, coefficient of variation, Kolmogorov-Smirnov/Shapiro-Wilk tests) and visual methods (histograms and Q-Q plots). Kurtosis and skewness values within the range of ±1.5 were considered indicative of conformity to the normal distribution hypothesis. The Independent Samples t-test was used when the normal distribution hypothesis was met, and the Mann-Whitney U test was used when it was not. Pearson correlation analysis was applied to normally distributed data, while Spearman correlation analysis was used for non-normally distributed data to explore relationships among PANSS, CDSS, TLI, C-SSRS, and PSP scores. Linear (simple) regression and multivariate regression analyses were conducted to assess whether patients' suicidal tendencies (as measured by the C-SSRS) could be predicted by other psychometric features. The mediating roles of depressive symptoms and the dysfunction subscale of the Personal and Social Performance Scale (PSP-D) in the relationship between FTD-ITS and suicide attempts were analyzed using the general linear model (GLM) procedure. The significance level for all statistical analyses in the study was set at $p<0.05$.

Table 1: Comparison of sociodemographic and clinical characteristics of patients with early psychosis with and without suicide attempt

	PEP with suicide attempt (n=30)		PEP without suicide attempt (n=34)		p
	Mean±SD	Min–Max/(%)	Mean±SD	Min–Max/(%)	
Age	32.67±11.07	18.00–56.00	30.65±9.22	18.00–53.00	0.429*
Gender					0.638†
Female (n)	15	50.0%	15	44.1%	
Male (n)	15	50.0%	19	55.9%	
Marital status					0.290‡
Single (n)	18	60.0%	24	70.6%	
Married (n)	8	26.7%	9	26.5%	
Separated/divorced (n)	4	13.3%	1	2.9%	
Years of education	8.90±3.92	0–16.00	9.56±4.59	0–17.00	0.542*
Employment status					0.247‡
Unemployed (n)	20	66.7%	27	79.4%	
Irregular employment (n)	10	33.3%	6	17.6%	
Employed (n)	0	0.0%	1	2.9%	
Current tobacco use					
Yes (n)	20	66.7%	16	47.1%	0.115‡
Alcohol use					
Yes (n)	2	6.7%	3	8.8%	0.748‡
Comorbid medical conditions					0.917‡
Present (n)	5	16.7%	6	17.6%	
Absent (n)	25	83.3%	28	82.4%	
Family history of psychiatric illness					**0.011**‡
Present (n)	13	43.3%	5	14.7%	
Absent (n)	17	56.7%	29	85.3%	
Age at illness onset	31.70±11.43	13.00–56.00	29.44±10.22	15.00–52.00	0.407‡
Duration of untreated illness (weeks)	60.43±83.20	1.00–312.00	104.79±101.97	1.00–416.00	**0.011**§
Duration of untreated psychosis (weeks)	12.07±15.17	1.00–52.00	31.15±60.20	1.00–310.00	0.131§
Number of psychotic episodes	1.07±0.25	1.00–2.00	1.06±0.24	1.00–2.00	0.898§
Number of hospitalizations	0.97±0.18	0.00–1.00	0.85±0.44	0.00–2.00	0.170§
Use of regular medication					0.423‡
Yes (n)	7	23.3%	11	32.4%	
No (n)	23	76.7%	23	67.6%	

p<0.05. PEP: Patients with Early Psychosis; M: Mean; SD: Standard deviation; *Student t-Test was used; †: Chi-Square Test was used; ‡: Fisher's Exact Chi-square test was used; §: Mann-Whitney U Test was used.

RESULTS

There were no statistically significant differences in age (p=0.429), gender (p=0.638), marital status (p=0.290), total years of education (p=0.542), or employment status (p=0.247) between early psychosis patients with and without a history of suicide attempts. Similarly, no significant group differences were found in smoking (p=0.115), alcohol use (p=0.748), presence of comorbid medical conditions (p=0.917), age at disease onset (p=0.407), number of psychotic episodes (p=0.898), number of hospitalizations (p=0.170), or regular use of medication (p=0.423). However, patients with suicide attempts were significantly more likely to have a family history of psychiatric illness (p=0.011). Additionally, patients without suicide attempts had a significantly longer duration of illness (p=0.012) and longer duration of untreated illness (p=0.011)

Table 2: Comparison of TLI mean scores in patients with early psychosis with and without suicide attempts

	PEP with suicide attempt (n=30)		PEP without suicide attempt (n=34)		Z	p
	Mean±SD	Median	Mean±SD	Median		
Poverty of speech	0.54±1.39	0.00	1.54±1.96	0.75	-2.44	**0.015**
Weakening of goal	0.29±0.86	0.00	0.82±0.98	0.38	-3.10	**0.002**
Perseveration	0.16±0.34	0.00	0.47±0.58	0.25	-2.77	**0.006**
Impoverishment of thought subscale total	0.99±2.18	0.25	2.84±2.95	2.25	-3.46	**0.001**
Looseness	1.52±1.53	1.00	0.97±1.45	0.63	-2.30	**0.021**
Peculiar words	0.66±1.13	0.25	0.50±0.69	0.25	-0.24	0.814
Peculiar sentences	0.39±1.30	0.00	0.28±0.59	0.00	-0.26	0.792
Peculiar logic	1.39±0.98	1.25	0.88±1.43	0.50	-3.01	**0.003**
Distractibility	0.20±0.55	0.00	0.29±1.38	0.00	-0.57	0.568
Disorganization of thought subscale total	4.12±4.68	2.50	2.93±4.68	1.75	-2.10	**0.036**
Thought and Language Index total score 134	5.11±4.58	4.00	5.76±4.72	4.13	-0.95	0.342

p<0.05. TLI: Thought and Language Index; M: Mean; SD: Standard deviation; PEP: Patients with early psychosis. Mann-Whitney U test was used.

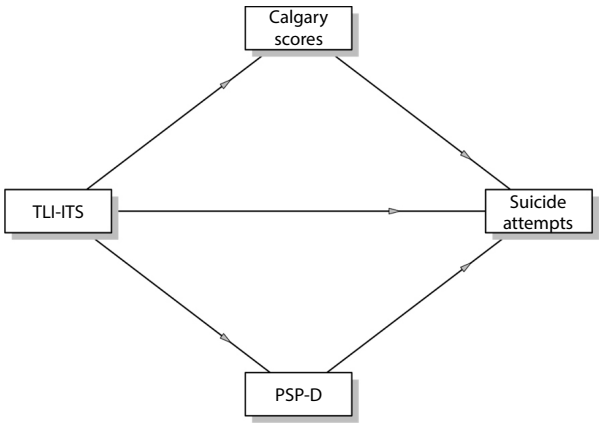

Figure 1. Indirect and total effects of the Impoverishment of Thought subscale of the Thought and Language Index on suicide attempts, mediated by scores on the Calgary Depression Scale for Schizophrenia and the Disturbing and Aggressive Behaviors subscale of the Personal and Social Performance Scale.

TLI-ITS: Impoverishment of Thought Subscale of the Thought and Language Index; Calgary: Calgary Depression Scale for Schizophrenia; PSP-D: Disturbing and Aggressive Behaviors Subscale of the Personal and Social Performance Scale.

compared to those who had attempted suicide. No significant difference was found between the groups in terms of duration of untreated psychosis (p=0.131). A comparison of sociodemographic and clinical variables is presented in Table 1.

Among patients who had attempted suicide, mean scores on the Impoverishment of Thought subscale (Z=-3.46, p=0.001), as well as on the Poverty of Speech (Z=-2.44, p=0.015), Weakening of Goal (Z=-3.10, p=0.002), and Perseveration (Z=-2.77, p=0.006) items of the Thought and Language Index, were statistically significantly lower than those of patients who had not attempted suicide. In contrast, mean scores on the Disorganization of Thought subscale (Z=-2.10, p=0.036), and its items Looseness (Z=-2.30, p=0.021) and Peculiar Logic (Z=-3.01, p=0.003), were significantly higher in patients who had attempted suicide. A comparison of TLI scores between patients with and without suicide attempts is presented in Table 2.

The PSP-A (t=-3.09, p=0.003), PSP-B (t=-2.35, p=0.022), PSP-C (t=-4,70, p<0.001), PSP-D (t=-9.20, p<0.001), and PSP total scores (t=-9.20, p<0.001) were statistically significantly higher in patients without suicide attempts compared to those who had attempted suicide. Among patients who had attempted suicide, CDSS total (Z=-6.50, p<0.001), PANSS-P (t=3.13, p=0.003), and PANSS total (Z=-2.37, p=0.018) scores were statistically significantly higher than those in patients without suicide attempts. A comparison of the psychometric test results between the two groups is presented in Table 3.

Among early psychosis patients (n=64), no statistically significant relationship (p>0.05) was found between total TLI scores and the total or subscale scores of the C-SSRS. However, a statistically significant negative relationship (p<0.05) was observed between TLI-ITS and both the C-SSRS total score and its subscale scores. Additionally, a statistically significant positive relationship (p<0.05) was found between the TLI-DTS total scores and the C-SSRS total and subscale scores, with correlation coefficients ranging from r=0.254 to r=0.416. The C-SSRS total and subscale

Table 3: Comparison of psychometric test scores between patients with early psychosis with and without suicide attempts

	PEP with suicide attempt (n=30)		PEP without suicide attempt (n=34)		Z/t	p
	Mean±SD	Median	Mean±SD	Median		
C-SSRS						
SI (last 1 month)	3.83±1.51	4.00	0.47±1.02	0.00	-6.30	**<0.001***
IoI (last 1 month)	19.33±7.46	20.00	2.47±4.74	0.00	-6.46	**<0.001***
SB (last 3 months)	3.37±1.63	3.50	0.03±0.17	0.00	-7.42	**<0.001***
C-SSRS lifetime	28.33±6.46	29.50	5.12±6.28	0.00	-6.83	**<0.001†**
C-SSRS recent times	26.53±9.71	29.50	3.00±5.73	0.00	-6.56	**<0.001***
PANSS						
PANSS-P	24.67±5.06	25.50	20.15±6.33	20.00	3.13	**0.003***
PANSS-N	19.00±5.09	18.50	18.97±6.02	19.00	0.02	0.983*
PANSS-G	38.23±9.83	38.50	35.50±9.22	36.00	-1.67	0.095†
PANSS total	83.10±13.25	81.00	71.79±20.62	75.50	-2.37	**0.018†**
CDSS						
CDSS total	11.20±3.18	11.00	3.18±2.38	2.50	-6.50	**<0.001†**
PSP						
PSP-A	8.00±4.28	7.50	11.91±5.64	10.00	-3.09	**0.003***
PSP-B	7.83±4.29	5.00	10.88±5.84	10.00	-2.35	**0.022***
PSP-C	12.83±4.29	15.00	18.09±4.61	20.00	-4.70	**<0.001***
PSP-D	3.33±3.30	5.00	15.88±6.80	15.00	-9.20	**<0.001***
PSP total	32.00±12.15	30.00	56.76±18.13	55.00	-6.33	**<0.001***

p<0.05. PEP: Patients with early psychosis; M: Mean; SD: Standard deviation; SI: Suicidal Ideation; IoI: Intensity of Ideation; SB: Suicidal behavior; C-SSRS: Columbia Suicide Severity Rating Scale; PANSS: Positive and Negative Syndrome Scale; CDSS: Calgary Depression Scale for Schizophrenia; PSP-A: Personal and Social Performance Scale – Socially Useful Activities Subscale; PSP-B: Personal and Social Performance Scale – Personal and Social Relationships Subscale; PSP-C: Personal and Social Performance Scale – Self-Care Subscale; PSP-D: Personal and Social Performance Scale – Disturbing and Aggressive Behaviors Subscale; *: Student's t-Test was used; †: Mann-Whitney U Test was used.

scores also showed a statistically significant negative correlation with PSP total and subscale scores, with correlation coefficients ranging from r=-0.287 to r=-0.731. Furthermore, a statistically significant positive correlation (p<0.001) was found between CDSS scores and the C-SSRS total and subscale scores, with correlation coefficients ranging from r=0.778 to r=0.845. Data on the correlations between the C-SSRS and other scales for the entire cohort are presented in Table 4.

When the results of the mediation analysis were examined (Fig. 1, Table 5), the direct effect of TLI-ITS on suicide attempts was not significant. However, a significant indirect effect on suicide attempts was observed through TLI-ITS's influence on CDSS and PSP-D scores. There was a negative relationship between TLI-ITS scores and CDSS scores (p<0.001), and it was found that lower CDSS scores were associated with a reduced risk of suicide attempts (p<0.001). Additionally, TLI-ITS scores were found to be associated with an increase in PSP-D scores (p<0.026), and higher PSP-D scores, in turn, were associated with a decrease in suicide attempts (p<0.001).

DISCUSSION

In this study, we conducted both comparative and mediation analyses to examine thought and language pathologies, social functionality, depressive symptoms, and disease severity in early psychosis patients with and without a history of suicide attempts. Our aim was to investigate both the direct and indirect effects of FTDs on suicidal ideation and behavior, while also evaluating the roles of depressive symptoms, social functioning, and disease severity as both independent contributors to suicide risk and potential mediators of the relationship between FTDs and suicidality.

According to the results of the present study, patients who had attempted suicide exhibited lower levels of impoverishment of thought and higher levels of disorganization of thought. This finding partially aligns with the work of Nordentoft et al. (47), who reported a negative relationship between thought disorders and suicidal behavior, suggesting that patients with thought disorders experienced a

Table 4: Correlations between C-SSRS scores and other psychometric test results

	TLI-ITS	TLI-DTS	TLI-total	PANSS-P	PANSS-N	PANSS-G	PANSS total	CDSS	PSP-A	PSP-B	PSP-C	PSP-D	PSP total
SI (last 1 month)	-0.50*†	0.37*†	-0.07†	0.35*†	0.14†	0.37*†	0.40*†	0.81*†	-0.37*†	-0.34*†	-0.56*†	-0.67*†	-0.63*†
Iol (last 1 month)	-0.51*†	0.42*†	-0.03†	0.41*‡	0.1‡	0.24‡	0.35*‡	0.83*‡	-0.46*‡	-0.34*‡	-0.58*‡	-0.70*‡	-0.66*‡
SB (last 3 months)	-0.49*†	0.31*†	-0.13†	0.34*‡	0.09‡	0.19‡	0.34*‡	0.78*‡	-0.34*‡	-0.30*‡	-0.47*‡	-0.69*‡	-0.58*‡
C-SSRS lifetime	-0.47*†	0.36*†	-0.06†	0.40*‡	0.07‡	0.25*‡	0.34*‡	0.85*‡	-0.45*‡	-0.32*‡	-0.59*‡	-0.72*‡	-0.66*‡
C-SSRS recent times	**-0.51*†**	**0.41*†**	**-0.05†**	**0.43*†**	**0.1†**	**0.34*†**	**0.40*†**	**0.82*†**	**-0.45*†**	**-0.32*†**	**-0.58*†**	**-0.73*†**	**-0.68*†**

*: p<0.05. SI: Suicidal Ideation; Iol: Intensity of Ideation; SB: Suicidal Behavior; C-SSRS: Columbia Suicide Severity Rating Scale; PANSS: Positive and Negative Syndrome Scale; TLI: Thought and Language Index; TLI-ITS: Impoverishment of Thought Subscale of the Thought and Language Index; TLI-DTS: Disorganization of Thought Subscale of the Thought and Language Index; CDSS: Calgary Depression Scale for Schizophrenia; PSP-A: Socially Useful Activities Subscale of the Personal and Social Performance Scale; PSP-B: Personal and Social Relationships Subscale of the Personal and Social Performance Scale; PSP-C: Self-Care Subscale of the Personal and Social Performance Scale; PSP-D: Disturbing and Aggressive Behaviors Subscale of the Personal and Social Performance Scale. †: Spearman correlation analysis was used; ‡: Pearson correlation analysis was used.

prolonged duration of untreated psychosis, which may have allowed them to survive the high-risk period. However, in that study, negative and positive FTDs were assessed together. In contrast, the TLI-ITS in our study assesses negative FTDs, characterized by poverty of speech, weakening of goal, and perseveration. These symptoms reflect a reduction in fluency, complexity, and goal-directedness of thought, indicating a structural disorganization of thought processes, rather than deficits in emotional expression or motivation. In contrast to negative symptoms such as anhedonia or avolition, which pertain to diminished emotional experience or volition, the TLI-ITS targets impairments in the form of thought and language. This distinction highlights its clinical relevance as a unique predictor of functional impairment and suicide risk in early psychosis. It has been shown that negative FTDs tend to become more prominent in the chronic stages of the illness, while positive FTDs typically emerge during acute episodes (25). Therefore, the association between positive FTDs and suicide attempts observed in our study may be expected, particularly since these symptoms are more likely to occur during the acute phase of the disease, which is marked by an elevated risk of suicide (3, 5, 38). Conversely, a higher prevalence of negative FTDs was expected to be associated with a reduced risk of suicide attempts, as these symptoms are more common in the chronic stages of the disease, when the acute, high-risk period may have already passed. However, further research is needed to confirm this interpretation.

Interestingly, our mediation analysis suggested that impoverishment of thought may be indirectly associated with a reduced risk of suicide attempts, potentially through its influence on increased aggression in early psychosis. The relationship between FTDs and aggression may be explained by the possibility that impoverishment of thought leads to a reduced ability to express oneself verbally, prompting a shift toward behavioral forms of expression. Alternatively, this finding may reflect the community's perception of disorganized behaviors, arising from disorganized thoughts, as aggressive. While some literature suggests an association between thought disorders and aggressive behavior (48), it is important to note that our study did not directly assess aggression. The PSP-D subscale, which reflects aggressive behavior, was used as an indirect indicator and may not accurately capture aggressive tendencies. In fact, our mediation analysis indicated that higher PSP-D scores were associated with reduced

Table 5: Direct, indirect, and total effects of the TLI-ITS on suicide attempts, mediated by Calgary Depression Scale for Schizophrenia and Disturbing and Aggressive Behaviors subscale of the Personal and Social Performance Scale

				95% CI (a)				
Type	**Effect**	**Estimate**	**SE**	**Lower**	**Upper**	**β**	**z**	**p**
Indirect	TLI-ITS ⇒ CALGARY SCORES ⇒ SUICIDE ATTEMPTS	-0.0429	0.01364	-0.0697	-0.0162	-0.23546	-3.1476	0.002
	TLI-ITS ⇒ PSP-D ⇒ SUICIDE ATTEMPTS	-0.0181	0.00912	-0.0360	-2.37e−4	-0.09933	-1.9859	0.047
Component	TLI-ITS ⇒ CALGARY SCORES	-0.7276	0.20207	-1.1236	-0.3315	-0.41042	-3.6006	<0.001
	CALGARY SCORES ⇒ SUICIDE ATTEMPTS	0.0590	0.00910	0.0412	0.0769	0.57369	6.4824	<0.001
	TLI-ITS ⇒ PSP-D	0.8061	0.36291	0.0948	1.5174	0.26754	2.2213	0.026
	PSP-D ⇒ SUICIDE ATTEMPTS	-0.0225	0.00507	-0.0324	-0.0125	-0.37125	-4.4325	<0.001
Direct	TLI-ITS ⇒ SUICIDE ATTEMPTS	-3.6404	0.01234	-0.0246	0.0238	-0.00200	-0.0295	0.976
Total	TLI-ITS ⇒ SUICIDE ATTEMPTS	-0.0614	0.02164	-0.1038	-0.0190	-0.33678	-2.8389	0.005

CI: Confidence interval; SE: Standard error; TLI-ITS: Impoverishment of Thought Subscale of the Thought and Language Index; Calgary: Calgary Depression Scale for Schizophrenia; PSP-D: Disturbing and Aggressive Behaviors Subscale of the Personal and Social Performance Scale.

suicide attempts, which may appear contradictory if PSP-D is assumed to reflects aggression. This finding contrasts with the broader literature, in which increased aggression is typically linked to a higher risk of suicide attempts in schizophrenia (49). It is possible that methodological factors, such as sample characteristics or the use of PSP-D to assess aggressive behavior, contributed to this discrepancy. Further research is needed to clarify the nature of the relationship between FTDs, aggression, and suicide risk in the context of early psychosis.

In our study, a relationship was found between FTDs and depressive symptoms, and the mediation analysis suggested that impoverishment of thought may be indirectly associated with a reduced risk of suicide attempts through its influence on decreased depressive symptoms in patients with early psychosis. In contrast, a study by Ulas et al. (41) reported no such association between depressive symptoms and FTDs, suggesting that thought disorders in schizophrenia may occur independently of comorbid depressive symptoms. The association observed in our study between depressive symptoms and FTDs may be explained by the possibility that thought disorders trigger social withdrawal and impair interpersonal communication and social participation, thereby facilitating the emergence or intensification of depressive symptoms (50, 51). Additionally, depressive symptoms were associated with suicidal ideation even in patients who had not attempted suicide, suggesting that the presence of a depressive mood may increase suicidal thoughts regardless of actual suicide attempts. Existing literature supports the high prevalence of depression among patients with early psychosis and identifies it as a significant predictor of suicide (35, 37, 52, 53). Nordentoft et al. (47) reported that the presence of psychotic symptoms and depression were the two most important risk factors for suicide attempts in patients with schizophrenia. The negative impact of depressive symptoms, when combined with the challenges posed by schizophrenia, may contribute to the increased risk of suicide attempts. Furthermore, difficulties in comprehending psychotic symptoms during the initial phase of the illness, combined with the fear of mental disintegration, which is known to be associated with suicide risk (7), are also likely to contribute to heightened suicide risk.

The present study also identified a correlation between suicidal ideation/behavior and social functioning in patients with early psychosis. Notably, patients who did not attempt suicide exhibited better

social functioning, engaged in socially beneficial activities, maintained healthier personal and social relationships, and demonstrated better self-care. These findings align with those of Robinson et al. (35), who reported that poor functioning at the onset of treatment in patients with first-episode psychosis was associated with subsequent suicide attempts. However, a study by Westermeyer et al. (54) demonstrated an association between high premorbid functioning and suicide attempts.

Additionally, we observed that patients who had attempted suicide were more likely to have a family history of mental illness. This finding is consistent with previous studies suggesting that a family history of depression and suicide (7), as well as having a first-degree relative diagnosed with schizophrenia, bipolar disorder, or a substance use disorder (55), may increase the risk of suicide.

In the current study, patients who had attempted suicide were found to have a shorter duration of illness and a shorter duration of untreated illness compared to those who had not attempted suicide. However, no significant difference was observed in the duration of untreated psychosis. Our findings regarding the duration of untreated psychosis diverge from most of the results reported in the existing literature. A recent meta-analysis by Catalan et al. (56) reported that a longer duration of untreated psychosis was associated with suicide attempts. The relatively small sample size may have limited our ability to detect subtle but meaningful associations between duration of untreated psychosis and suicide attempts. In contrast to the broader literature, Preti et al. (8) reported that a shorter duration of untreated psychosis was associated with suicide attempts; however, no such relationship was found for the duration of untreated illness. Consistent with our findings, some other studies have also reported no significant relationship between the duration of untreated psychosis and suicide attempts (47, 52). In a study investigating the frequency of suicide attempts in patients with first-episode psychosis, approximately 26% of patients had attempted suicide before treatment (10). Considering the heightened risk during the pre-treatment period and the short duration of untreated illness in patients who attempted suicide in the current study, these findings underscore the importance of implementing preventive measures against suicide during this vulnerable period.

This study has several limitations. The cross-sectional design fundamentally limits the ability to draw causal inferences, so the findings should be interpreted with caution. The clinician who administered the Thought and Language Index was not blinded to participants' diagnoses, which may have introduced bias. Moreover, the relatively small sample size may have reduced the statistical power of the findings. Due to this limitation, some potential variables could not be included in the mediation model, which may further limit the generalizability of the results. Additionally, the study was conducted at a single center, which restricts the applicability of the findings to the broader population of individuals with early psychosis. Given the difficulty of recruiting patients with early psychosis and the resulting small sample size, strict exclusion criteria were employed to ensure sample homogeneity. However, this methodological choice may have further constrained generalizability. Another limitation is that the PSP-D subscale, used as an indicator of aggressive behavior, may not fully capture the multifaceted nature of aggression. Despite these limitations, a notable strength of the study is the inclusion of individuals in the early stages of psychosis, a population that is typically difficult to access in clinical research.

CONCLUSION

In conclusion, our findings indicate that impoverishment of thought reduces depressive symptoms and increases disruptive and aggressive behavior, thereby lowering the risk of suicide attempts in patients with early psychosis. Furthermore, the results suggest that patients at higher risk for suicide attempts in early psychosis tend to exhibit fewer negative FTDs, more positive FTDs, poorer social functioning, greater depressive symptoms, and more severe positive symptoms. A family history of psychiatric illness, shorter total illness duration, and shorter duration of untreated illness also appear to contribute to the elevated risk in this group.

Ethical Approval: The Prof. Mazhar Osman Training and Research Hospital for Psychiatry, Neurology, and Neurosurgery Clinical Research Ethics Committee granted approval for this study (date: 01.10.2019, number: 364).

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RESEARCH ARTICLE

Validity and reliability of the Frith-Happé Animation Test in a Turkish sample

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ABSTRACT

Objective: The lack of assessments for social cognitive functions in Turkiye highlights the need for valid and reliable measurement tools in this field. This study aims to examine the reliability and validity of the Frith-Happé Animation Test (AT) in a Turkish sample. Additionally, it investigates the impact of demographic variables such as age, gender, and education level on AT performance, and explores differences in social cognitive functions between individuals with Autism Spectrum Disorder (ASD) and a healthy control group using the AT.

Method: The study included 267 healthy adults (145 females, 122 males) aged 18-45, along with 20 individuals diagnosed with ASD (four females, 16 males) aged 18-39. Participants were categorized by gender, age group (18-25, 26-35, 36-45 years), and educational attainment (lower: ≤12 years; higher: >12 years). The AT and the Dokuz Eylul Theory of Mind Scale (DEToMS) were administered.

Results: The AT demonstrated high internal consistency, with Cronbach's alpha coefficients of 0.673 for intentionality, 0.679 for appropriateness, 0.799 for certainty, and 0.906 for length. Test-retest analysis showed high stability in intentionality scores overall (r=0.835) and across different animation types. Criterion validity was moderate, with positive correlations between DEToMS total scores and intentionality scores (overall r=0.443; goal-directed r=0.368; theory of mind [ToM] r=0.437). Additionally, healthy individuals demonstrated better AT performance than those with ASD.

Conclusion: This study demonstrates that the Frith-Happé Animation Test is a valid and reliable measurement tool in a Turkish sample. In this context, it serves as an effective instrument for assessing social cognition and holds significant potential to contribute to future clinical assessments and scientific research.

Keywords: Autism spectrum disorder, Frith-Happé animation test, reliability, social cognition, validity

INTRODUCTION

Social cognition (SC) is the ability to perceive and interpret others' intentions, behaviors, and emotions, leading to appropriate responses (1). Key components of SC include emotion processing, social perception, attributional styles, and theory of mind (ToM). Theory of mind, the most extensively studied aspect, is divided into cognitive ToM, which involves inferring others' thoughts and beliefs, and emotional ToM, which focuses on understanding emotions (2). Additionally, ToM can be classified as explicit, involving conscious effort, or implicit, which occurs automatically (3).

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Impairments in ToM functions are commonly observed in various psychiatric, neurological, and developmental conditions (4). These impairments may lead to significant difficulties in social functioning by negatively affecting an individual's ability to understand the emotions and thoughts of others, accurately interpret social cues, and respond appropriately in social situations (5). Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by difficulties in social communication, repetitive behaviors, and impairments in social cognitive functions, which are central to the disorder (6). Social cognitive deficits in individuals with ASD are thought to primarily stem from impairments in ToM (7). These deficits have been reported to persist into adulthood, not only during childhood (8).

Currently, social cognitive functions are assessed for various purposes, including understanding their nature in healthy individuals, examining impairments in clinical populations, conducting scientific research, and performing neuropsychological evaluations. Compared to the international literature, Turkiye lacks sufficient studies and measurement tools for assessing social cognitive functions. Most research in this area has focused on adapting existing international measurement tools for use with Turkish samples. Validity and reliability studies have been conducted for tests such as the Reading the Mind in the Eyes Test (9), the Faux Pas Recognition Test (10), and the Edinburgh Social Cognition Test (ESCoT) (11). Nevertheless, the Dokuz Eylul Theory of Mind Scale (DEToMS), a measurement tool developed in Turkiye, significantly contributes to the field by evaluating various components of ToM (12). In Turkiye, the most commonly administered tests typically focus on evaluating human characteristics such as facial expressions, language usage, and social cues. However, social cognitive functions can also be assessed through abstract scenarios involving the movement of various shapes (13). The Frith-Happé Animation Test (AT), widely used internationally, provides a new approach to assessing SC. It emphasizes the ability to attribute mental states and emotions to the movements of simple geometric shapes, rather than relying on human features (14). The AT evaluates participants' interpretations of animations, ranging from simple random movements to those suggesting complex mental states (15). There is a significant need in Turkiye for assessment tools that explore social cognitive functions from diverse perspectives and support a broader evaluation of these abilities.

This study aimed to assess the validity and reliability of the Frith-Happé Animation Test within a Turkish sample, as well as to determine its suitability for scientific research and clinical evaluation. Additionally, the study sought to investigate the impact of demographic variables, such as age, gender, and education level, on AT performance among healthy individuals. Finally, the study aimed to explore the ability of the AT to differentiate the social cognitive functions of individuals diagnosed with ASD from those of healthy counterparts. The findings are expected to support the wider dissemination of the test in Turkiye, thereby providing a strong foundation for cross-cultural studies on SC.

METHODS

Study Design and Setting

This study, designed to evaluate the validity and reliability of the AT in a Turkish sample, was conducted between October 2023 and April 2024. Permission to use the test was obtained from Dr. Sarah White of the Institute of Cognitive Neuroscience at University College London. Ethical approval was granted by the Dokuz Eylul University Social and Human Sciences Scientific Research and Publication Ethics Committee (E-87347630-659-553803). Informed written consent was obtained from all participants.

The study examined the effects of three independent variables on AT performance: gender (female, male), educational attainment (lower, higher), and age (18-25, 26-35, 36-45 years). The dependent variables were AT scores related to intentionality, appropriateness, certainty, and length.

Participants

A total of 267 healthy adults participated in the study, comprising 145 females (54.3%) and 122 males (45.7%). Participants were aged between 18 and 45 years, with a mean age of 29.88 years (standard deviation [SD]=9.71), and none had any psychiatric or neurological disorders. The age variable was categorized into three groups: 18-25 years, 26-35 years, and 36-45 years. Education levels were classified as lower educational attainment (≤12 years) and higher educational attainment (>12 years). Demographic information for the healthy participants is presented in Table 1.

The clinical sample consisted of 20 adults diagnosed with ASD (four females, 20%; 16 males, 80%), aged between 18 and 39 years (mean

Table 1: Demographic characteristics of healthy participants by age group and educational level

Educational attainment	Age group		
	18-25	26-35	36-45
Lower			
N	54	40	40
Gender (M/F)	22/32	20/20	20/20
Age	18.69±0.72	30.53±3.12	42.50±2.68
Higher			
N	51	41	41
Gender (M/F)	20/31	20/21	20/21
Age	21.16±1.19	29.32±3.29	42.27±2.66

M: Male; F: Female, Lower Educational Attainment (≤12 years); Higher Educational Attainment (>12 years).

age=20.75, SD=4.74). Following the release of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), the diagnostic criteria for autism spectrum disorders were revised, leading to the consolidation of all diagnoses under the umbrella term ASD (6). Accordingly, all participants in this study were assessed based on the DSM-5 criteria and treated as a single diagnostic group. Inclusion criteria required that participants have no additional psychiatric diagnoses.

Individuals with ASD were voluntarily recruited from those receiving treatment at Çanakkale Onsekiz Mart University, Faculty of Medicine, Department of Mental Health and Diseases, as well as from rehabilitation centers. Eligibility and diagnostic consistency were confirmed in collaboration with mental health professionals, including psychiatrists and psychologists from the respective institutions. Participants' medical histories were thoroughly reviewed, and individuals with co-occurring psychiatric or neurological disorders or intellectual disabilities were excluded. Only those who met all inclusion criteria and provided informed consent were included in the study. Additionally, participants with ASD were matched with a control group of 20 healthy individuals based on demographic characteristics such as age, gender, and educational attainment.

All participants were included in the study if they met the following criteria: no history of brain surgery, head trauma, intellectual disability, or alcohol/substance abuse within the past year, and no visual or auditory impairments that would interfere with test administration.

Measures

Demographic Information Form

This form collects participant information including age, gender, education level, employment status, occupation, psychiatric and neurological history, substance abuse history, and history of head trauma or surgery.

Clinical Information Form

Designed for participants diagnosed with ASD, this form includes questions about age at diagnosis, medication use, comorbid psychiatric or neurological diagnoses, and relevant family medical history.

Frith-Happé Animation Test (AT)

Developed by Abell et al. (16), the AT assesses ToM skills and consists of two exercises and 12 test animations. The silent animations feature scenes where a large red triangle and a small blue triangle move in different ways. The AT includes three conditions: random, goal-directed, and ToM-related movements, with four animations per condition. In the random condition, the triangles move independently and aimlessly. In the goal-directed condition, the triangles engage in physical interactions toward a specific objective. In the ToM condition, the triangles display movements that suggest social interactions such as teasing, persuasion, or surprise, allowing individuals to infer mental states. After each animation, the researcher recorded participants' responses to the question, "What happened in this animation?" The AT is evaluated based on the criteria of intentionality (0-5 points), appropriateness (0-3 points), certainty (0-3 points) and length (0-4 points). Intentionality scores reflect the extent to which participants attribute mental states and intentions to the triangles. Appropriateness scores measure how well the response aligns with the animation content. Certainty scores indicate the clarity and confidence of the participant's interpretation. Length scores assess how detailed the responses were. In addition to this subjective scoring method (14), which allows participants to provide open-ended responses, there is also an objective scoring method available (17).

Dokuz Eylul Theory of Mind Scale (DEToMS)

The DEToMS was developed to assess individuals' ability to recognize false beliefs, metaphors, irony, and faux pas. The test includes seven story-based tasks and two picture-based tasks. In the story tasks, participants answer questions related to the narrative. In the picture tasks, they are asked to choose the fourth

Table 2: Comparison of Frith-Happé Animation Test scores across age groups in healthy participants

	18-25 age Mean±SD	26-35 age Mean±SD	36-45 age Mean±SD	F (2, 264)	Post-Hoc
Intentionality	2.250±0.408	2.030±0.382	1.971±0.456	F=11.859	18-25>26-35 **(p=0.001)**
				p<0.001	18-25>36-45 **(p<0.001)**
					26-35=36-45 (p=0.643)
GD Intentionality	2.331±0.523	2.120±0.451	2.057±0.521	F=7.775	18-25>26-35 **(p=0.013)**
				p<0.001	18-25>36-45 **(p=0.001)**
					26-35=36-45 (p=0.698)
ToM Intentionality	3.600±0.703	3.199±0.681	2.991±0.808	F=16.884	18-25>26-35 **(p=0.001)**
				p<0.001	18-25>36-45 **(p<0.001)**
					26-35=36-45 (p=0.168)
ToM Appropriateness	1.900±0.504	1.757±0.425	1.720±0.465	F=3.888	18-25>26-35 **(p=0.001)**
				p=0.022	18-25>36-45 **(p=0.027)**
					26-35=36-45 (p=0.870)
Length	1.968±0.627	1.781±0.650	1.665±0.553	F=5.845	18-25>36-45 **(p=0.003)**
				p=0.003	18-25=26-35 (p=0.098)
					26-35=36-45 (p=0.450)

SD: Standard deviation; GD: Goal-directed; ToM: Theory of Mind. One-way analysis of variance (ANOVA) results are presented in the row under F (2, 264). A post hoc Tukey test was used to explore pairwise differences. p<0.05 was considered statistically significant (bold values).

picture from two options that best continues the sequence of three pictures. The total possible score on the test ranges from 0 to 16. The internal consistency coefficient of the scale was reported as 0.64, and the test-retest reliability was found to be 0.90 (12).

Procedures

The study began with adapting the test's administration and scoring instructions through a translation and back-translation process. Initially, the researcher translated the AT's administration and scoring materials into Turkish, incorporating feedback from subject matter experts. A language expert then translated the Turkish version back into English. This version was sent to Dr. Sarah White for comparison with the original. In this process, Dr. Sarah White's feedback was incorporated as needed, resulting in the final version of the test. Following this, a pilot study was conducted with a small group of 10 participants. Necessary adjustments were made based on verbal feedback from the participants regarding the overall application process and the clarity of the instructions.

The AT animations were presented in full-screen mode using Microsoft PowerPoint on a 15.6-inch screen with a 1080p resolution. Participants' responses were recorded with their consent in a quiet, face-to-face setting. To reduce fatigue and sequence bias, the order of the AT animations was randomized for each participant. Half of the participants completed the AT before the DEToMS, while the other half began with the DEToMS. Scoring was carried out by two independent raters, including the researcher, yielding inter-rater reliability coefficients ranging from 0.72 to 0.93. The DEToMS test was administered in printed format and included both the story and picture tasks. Test-retest reliability of the AT was examined with a sample of 30 healthy participants, who completed the test again after a 21-day interval. The study concluded with a thank-you to all participants.

Statistical Analysis

The dataset was examined for outliers, normality, and homogeneity. An independent samples t-test was used to assess differences based on gender and education level, while a one-way Analysis of Variance (ANOVA) was conducted to explore differences among age groups. Tukey's analysis was employed to identify the specific groups contributing to these differences. To evaluate the reliability of the AT, test-retest reliability and Cronbach's alpha internal consistency coefficients were calculated. Additionally, the Mann-Whitney U test was used to analyze score differences between the ASD group and healthy individuals. Spearman correlation analysis was conducted to examine the relationship between AT scores and the DEToMS total score, as part of the criterion validity assessment.

Table 3: Comparison of Frith-Happé Animation Test scores by educational attainment in healthy participants

	Lower educational attainment Mean±SD	Higher educational attainment Mean±SD	t (265)	p	d
Intentionality	2.045±0.437	2.152±0.423	-2.030	**0.043**	-0.248
ToM Intentionality	3.140±0.796	3.448±0.720	-3.317	**<0.001**	-0.406
Appropriateness	1.868±0.363	1.999±0.355	-2.987	**0.003**	-0.366
RAND Appropriateness	1.860±0.583	2.045±0.558	-2.650	**0.009**	-0.324
Length	1.703±0.613	1.936±0.615	-3.097	**0.002**	-0.379

SD: Standard deviation; ToM: Theory of mind; Rand: Random. Lower educational attainment: ≤12 years; Higher educational attainment: >12 years. p<0.05 indicates statistical significance (bold values).

RESULTS

Investigation of AT Scores According to Demographic Variables

An independent samples t-test was conducted to assess whether AT scores differed by gender. The findings indicated no statistically significant differences between male and female participants in terms of general intentionality (p=0.784), appropriateness (p=0.412), certainty (p=0.882), and length (p=0.096) scores. Additionally, the analysis revealed no significant gender-based differences in intentionality scores across the random, goal-directed, and theory-of-mind conditions (p=0.249, p=0.860, p=0.471, respectively). Similarly, appropriateness scores for AT in the random, goal-directed, and ToM conditions did not differ significantly between genders (p=0.789, p=0.361, p=0.358, respectively).

Table 2 presents the findings of the ANOVA conducted to determine whether AT scores among healthy participants varied by age group. The results showed that the general intentionality scores of participants in the 18-25 age group were significantly higher than those in the 26-35 and 36-45 age groups (p<0.001). Likewise, the 18-25 age group obtained higher intentionality scores in both the ToM (p<0.001) and goal-directed (p<0.001) conditions. However, comparisons between the 26-35 and 36-45 age groups were not statistically significant for general intentionality (p=0.643), ToM intentionality (p=0.168), or goal-directed intentionality scores (p=0.698). Intentionality scores for random animations did not differ significantly between age groups (p=0.508). In terms of appropriateness scores, only in the ToM condition did the 18-25 age group score higher than the other groups (p=0.022). The comparison between the 26-35 and 36-45 age groups was not statistically significant for appropriateness scores in the ToM condition (p=0.870). No significant differences were found between age groups for general appropriateness (p=0.286), goal-directed (p=0.093), or random (p=0.112) conditions. There were also no significant differences in certainty scores across age groups (p=0.905). Length scores showed that participants in the 18-25 age group provided longer explanations than those in the 36-45 age group (p=0.003). However, no statistically significant differences were observed between the 18-25 and 26-35 age groups (p=0.098), or between the 26-35 and 36-45 age groups (p=0.450).

An independent samples t-test was conducted to evaluate the effect of educational level on the AT scores of healthy participants. The results revealed that individuals with higher educational attainment had significantly higher intentionality scores in both the general intentionality condition (p=0.043) and the ToM condition (p<0.001) compared to those with lower educational attainment. Conversely, no significant differences were found in the random (p=0.304) and goal-directed (p=0.457) conditions based on education level. Furthermore, individuals with higher educational attainment demonstrated better appropriateness scores (p=0.003), including specifically in the random animation condition (p=0.009). Notably, appropriateness scores did not show significant differences based on educational level in the goal-directed (p=0.132), and ToM (p=0.108) conditions. Additionally, certainty scores were consistent across educational levels (p=0.273). The analysis also revealed that individuals with higher educational attainment provided significantly longer explanations than those with lower educational attainment (p=0.002). The related findings are presented in Table 3.

Table 4: Test-retest reliability and criterion validity of the Frith-Happé Animation Test based on the Dokuz Eylul Theory of Mind Scale

	Test-retest	DEToMS
Intentionality	0.835 **(p<0.001)**	0.443 **(p<0.001)**
GD Intentionality	0.756 **(p<0.001)**	0.368 **(p<0.001)**
RAND Intentionality	0.740 **(p<0.001)**	0.267 **(p<0.001)**
TOM Intentionality	0.862 **(p<0.001)**	0.437 **(p<0.001)**
Appropriateness	0.849 **(p<0.001)**	0.425 **(p<0.001)**
GD Appropriateness	0.981 **(p<0.001)**	0.395 **(p<0.001)**
RAND Appropriateness	0.756 **(p<0.001)**	0.423 **(p<0.001)**
TOM Appropriateness	0.846 **(p<0.001)**	0.332 **(p<0.001)**

DEToMS: Dokuz Eylul Theory of Mind Scale; GD: Goal-Directed; RAND: Random; TOM: Theory of mind. p<0.001 values are statistically significant (bold).

Table 5: Comparison of Frith-Happé Animation Test scores between participants with autism spectrum disorder and healthy controls

	HC		ASD		U	p
	Mean rank	Sum of ranks	Mean rank	Sum of ranks		
Intentionality	29.33	586.50	11.68	233.50	23.50	**<0.001**
GD Intentionality	27.78	555.50	13.23	264.50	54.50	**<0.001**
RAND Intentionality	21.85	437.00	19.15	383.00	173.00	**<0.001**
ToM Intentionality	29.88	597.50	11.13	222.50	12.50	**<0.001**
Appropriateness	25.48	509.50	15.53	310.50	100.50	**0.007**
GD Appropriateness	26.58	531.50	14.43	288.50	78.50	**<0.001**
RAND Appropriateness	16.18	323.50	24.83	496.50	113.50	**0.018**
ToM Appropriateness	28.58	571.50	12.43	248.50	38.50	**<0.001**

HC: Healthy control; ASD: Autism spectrum disorder; GD: Goal-directed; RAND: Random; ToM: Theory of mind. p<0.05 values are statistically significant (bold).

Reliability Analysis of the Frith-Happé Animation Test

Cronbach's alpha coefficients were used to assess the AT's internal consistency. The results showed good internal consistency for the following scores: intentionality (α=0.673), appropriateness (α=0.679), certainty (α=0.799), and length (α=0.906).

Test-retest measurements for all AT score types were assessed using Pearson correlation analysis. For the intentionality score, a strong positive correlation was found between the first and last measurements (r=0.835, p<0.001). Similarly, strong positive correlations were observed for goal-directed animations (r=0.756, p<0.001), random animations (r=0.740, p<0.001), and ToM animations (r=0.862, p<0.001). For the appropriateness score, there was also a strong positive correlation between the first and last measurements (r=0.849, p<0.001), as well as for goal-directed (r=0.981, p<0.001), random (r=0.756, p<0.001), and ToM animations (r=0.846, p<0.001). Additionally, strong positive correlations were found between the first and last measurements for certainty (r=0.704, p<0.001) and length (r=0.869, p<0.001). The related findings are presented in Table 4.

Validity Analysis of the Frith-Happé Animation Test

Correlation coefficients between the AT intentionality and appropriateness scores obtained from the healthy sample and the DEToMS total score were calculated to assess criterion-related validity. Only intentionality and appropriateness scores were selected, as they are considered more relevant to ToM skills. The results indicated a positive and moderate correlation between the total DEToMS score and the intentionality score (r=0.443, p<0.001), as well as the intentionality scores for goal-directed animations (r=0.368, p<0.001) and ToM animations (r=0.437, p<0.001). A positive but weak correlation was found between the intentionality score for random animations and the total DEToMS score (r=0.267, p<0.001). Similarly, there was a positive and moderate correlation between the total DEToMS score and the AT appropriateness score (r=0.425, p<0.001), as well as the appropriateness scores for goal-directed (r=0.395, p<0.001), random (r=0.423,

p<0.001), and ToM animations (r=0.332, p<0.001). The related findings are presented in Table 4.

When healthy individuals and individuals diagnosed with ASD were compared using the Mann-Whitney U test, healthy individuals were found to score higher across all AT score types, including intentionality and appropriateness scores for random, goal-directed, and ToM animations (p<0.001). Individuals with ASD scored higher than healthy participants only in the appropriateness scores for random animations (p=0.018). Table 5 presents the differences in intentionality and appropriateness scores between the two groups.

DISCUSSION

The Frith-Happé Animation Test demonstrated moderate to high internal consistency, high test-retest reliability, and moderate criterion validity within the Turkish sample.

The intentionality and appropriateness scores of the AT showed moderate internal consistency, while the certainty scores demonstrated higher internal consistency. The length scores exhibited the highest level of internal consistency. Consistent with previous studies (18, 19) that reported internal consistency coefficients for the AT, it can be concluded that the AT is a moderately to highly reliable measurement tool within the Turkish context. Similarly, the moderate internal consistency observed in the intentionality and appropriateness dimensions suggests potential areas for further refinement.

The measurements taken at two different time points for all AT score types showed high consistency. The strongest consistency between the two measurements was observed in the length of participants' responses, while the lowest consistency was found in the certainty scores, which reflect the extent to which participants hesitate or pause in their responses. For intentionality scores, the strongest relationship was observed in the ToM animations, followed by goal-directed and random animations. Similarly, for appropriateness scores, the strongest correlation was found in the goal-directed animations, followed by ToM and then random animations. These results indicate that reliable outcomes were obtained for the intentionality and appropriateness dimensions of the AT. The findings are partially consistent with those of a previous study (19). However, in contrast to that study, intentionality scores in the Turkish sample also demonstrated high consistency over time.

When individuals diagnosed with ASD were compared to demographically matched healthy adults on their AT scores, healthy individuals were found to perform significantly better in AT than those with ASD. Previous studies (17, 20), particularly the initial study (16) that introduced the AT, similarly reported poorer performance among participants with ASD. This finding suggests that healthy individuals not only possess stronger ToM skills but also engage in mentalization even in animations that do not specifically require it, such as random and goal-directed scenarios. Additionally, healthy individuals demonstrated higher appropriateness scores in goal-directed and ToM conditions, whereas individuals with ASD showed higher appropriateness scores in random animations. Although this may initially appear counterintuitive, it likely reflects logical and meaningful patterns related to social cognitive processes. Specifically, it may be related to differences in cognitive processing styles commonly observed in individuals with ASD. Random situations in the AT are designed to depict scenarios without clear purpose or interaction. It is already well-established that individuals with ASD are less likely to attribute intentional or mental states to social stimuli (21). Accordingly, individuals with ASD may describe situations based on physical features, without assigning social or mental meaning. In other words, describing a random situation in the AT at a physical level, such as saying "just moving shapes" may align more closely with the expected appropriate explanation and, therefore, increase their appropriateness scores. In contrast, individuals with typical development tend to attribute more mental states, which may lead them to assign intentions, relationships, or emotions even to random animations. In such cases, excessive social interpretation may lower their appropriateness scores.

In the healthy sample, positive and moderately strong correlations were found between all AT score types and the total DEToMS score. The lowest correlation was observed between the DEToMS score and AT length scores, while the highest correlation was, as expected, between the DEToMS score and AT intentionality scores. The highest correlation was observed between the DEToMS score and AT intentionality scores in the ToM condition, followed by the goal-directed and random conditions. Regarding appropriateness scores, the strongest correlation was found between the DEToMS score and scores from random animations, followed by goal-directed and ToM conditions. Similarly, in the ASD group, the relationships between DEToMS and AT scores were also positive

and moderate. Our findings are similar to previous research showing that AT scores correlate weakly with false belief test scores (17) and moderately with Faux Pas task scores (22). To date, no studies have examined the relationship between DEToMS and AT scores in the literature. The modest correlation between the two tests can be attributed to several factors, including the distinct components of ToM assessed by each test, the different methodologies employed, and the fact that the tests evaluate ToM in different contexts. Specifically, DEToMS assesses multiple dimensions of ToM, such as the recognition of false beliefs and faux pas, while AT's intentionality scores focus on individuals' attributions of mental states. Additionally, DEToMS measures these skills using story- and picture-based tasks, whereas AT evaluates them through non-verbal cues involving animated characters devoid of human characteristics. Finally, differences in scoring methods between the assessments may also contribute to the weakened correlation. Additionally, while the stimuli in DEToMS are structured and context-based, those in the AT are abstract and dynamic. DEToMS was developed in Turkish to reflect Turkish culture and lifestyle, whereas the AT, although universally applicable, is more open to cultural interpretation differences. For these reasons, the lack of a high correlation between the two tests can be attributed to the fact that they assess ToM from different perspectives. This also highlights the importance of multi-method evaluations in SC research. In this context, it is recommended that the AT be used alongside other assessment tools in both research and clinical settings where a comprehensive evaluation of SC is required. In our study, the total DEToMS score, a composite measure reflecting overall ToM ability, was used to assess the validity of the AT. However, it is advisable for future studies to analyze the DEToMS subscale scores separately. This approach may help clarify the relationships between AT performance and the various subcomponents of DEToMS: representation, meta-representation, and empathy.

Several factors contribute to the AT's failure to achieve higher levels of validity and reliability. These include the open-ended nature of the animations and participant responses, which affects scoring; linguistic and cultural differences, which influence the application of scoring instructions; and the similarity of scores used in the AT (e.g., appropriateness scores range from 0 to 3), which can negatively affect validity and reliability calculations. The type of assessment used in this study for AT allowed participants to give free-form responses. While this approach offers several advantages, it can also result in subjective scoring. Although the high level of consistency observed between independent raters in our study indicates that subjectivity was prevented, it is recommended that future studies develop a more standardized system to reduce interpretive bias arising from linguistic and conceptual differences in participants' responses. The objective assessment method proposed by White et al. (17), or the combined use of both methods, may offer an alternative. Moreover, the use of natural language processing technologies could help reduce the researcher's workload and enhance measurement reliability by enabling automatic and consistent analysis of open-ended responses. Additionally, the limited scoring range in the AT may have caused participants' scores to cluster closely together, thereby reducing variability. Kaplan and Saccuzzo (23) emphasize that the correlation coefficient depends on variability, and that calculations can be negatively affected when there is a limited range in the measurements. Furthermore, when it is necessary to test the differences between groups, low score diversity may also limit the revealing of these differences. Therefore, the closeness of scores in AT may have reduced the sensitivity of the validity and reliability analyses, resulting in only moderate levels of validity and reliability.

This study also explored the influence of demographic variables on the performance of healthy adults in the AT. It was found that gender did not significantly affect any type of AT score, and that the SC functions assessed by the AT were comparable between males and females. This finding aligns with previous research (18, 19), which reported no gender differences in intentionality scores—a key measure of ToM skills as evaluated by the AT. Conversely, this result contrasts with other studies (24, 25) that suggested women outperform men in SC functions. This discrepancy may stem from the fact that those studies focused on specific aspects of ToM, such as understanding false beliefs, recognizing emotions, or detecting faux pas, which differ from the focus of the current study, as well as differences in the types of tests and methodologies employed. Given that gender differences in ToM performance can be influenced by various factors—including the type of emotion (positive or negative), the gender of the characters in the test, and the sensory modality (e.g., visual or auditory) (24) —the unique structure of the AT may not adequately capture these gender differences.

Young adults were found to have higher intentionality scores in both the general and goal-

directed, as well as the ToM conditions, compared to the other two age groups. This result suggests that young adults made more mental inferences than older participants and provided more appropriate and accurate explanations in the ToM condition. The extended responses given by young adults may reflect their greater motivation and interest in the task. In short, young adults perform better in situations that require mentalizing. This finding is consistent with previous studies (26, 27) examining the effect of age on ToM, as well as studies (22, 28) that measured ToM skills using the AT. Additionally, the current study found that young adults demonstrated a superior understanding of the scenarios depicted in the ToM condition by providing more appropriate and detailed responses, which is a novel contribution to the literature. It is known that the effect of age on ToM skills is observed regardless of task type, modality, or whether the function is emotional or cognitive (27). Compared to the youngest group in our study, the lower AT scores observed in the 26-35 and 36-45 age groups may indicate a decline in ToM skills with age. This trend could also be attributed to the abstract, context-independent, and spontaneous inference demands of the Frith-Happé test, as well as the possible use of less effective strategies by older age groups in such tasks.

In this study, individuals with higher educational attainment scored higher on AT intentionality scores for ToM animations and had higher appropriateness scores for random animations. They provided more mental state explanations and were better at identifying the underlying narratives of the random animations. They also gave longer and more detailed explanations of the animations overall. However, no differences were found between education groups in intentionality scores for goal-directed and random animations, not in appropriateness scores for goal-directed and ToM conditions. These findings are similar to those of a limited number of studies (29, 30) examining the effect of education level on SC functions. To date, no studies have directly investigated the impact of education on SC as assessed by the AT. Therefore, the consistency of these findings obtained through the AT with the general literature increases the external validity of our results.

Given the observed effects of age and education, researchers and clinicians should consider how test results vary across these variables to avoid misinterpretation. In this study, individuals aged 18 to 45 were included, and their education levels were categorized into two groups: lower and higher educational attainment. While average AT scores for different age and education groups are presented in the tables, this information is insufficient. Future studies should consider including a broader age range, particularly older individuals. Additionally, it is recommended that normative values be established based on age, gender, and education level, taking into account differences in educational attainment.

This study has several strengths, including the matching of ASD and healthy control groups by age, education, and gender, as well as a relatively large sample size. However, certain limitations may affect the generalizability of the findings. Due to the difficulty of reaching individuals with only a primary school education, the AT data for low-educated participants was underrepresented. Additionally, since ASD is diagnosed approximately four times more frequently in males than in females (31), it was difficult to adequately include adult females over the age of 18 with an ASD diagnosis. As a result, the ASD group primarily consisted of adult males. The difficulty of accessing individuals with ASD who do not have comorbid conditions has generally led to limited sample sizes in ASD research. The limited sample size in this study, due to insufficient access to women with ASD and the exclusion of participants with comorbidities, limits the generalizability of the findings. Studies with more diverse samples may produce more accurate and generalizable results.

CONCLUSION

Social cognitive functions are crucial for human life, as they underpin social interaction and communication. Consequently, a variety of valid and reliable measurement tools are necessary to understand and evaluate the different dimensions of SC.

The results of the current study support the applicability of the AT for assessing SC in Turkiye, demonstrating moderate but acceptable validity and reliability. Moreover, the AT has the potential to distinguish between healthy individuals and those diagnosed with ASD in terms of ToM skills. Young adults with higher education levels exhibited stronger mentalizing abilities, as measured by the AT, while gender did not significantly impact AT performance.

Future research should aim to include a wider age range and more diverse clinical samples. Additionally, comparative studies are recommended to explore differences among individuals with low and middle levels of educational attainment.

Ethical Approval: The Dokuz Eylul University Social Sciences and Humanities Scientific Research and Publication Ethics Committee granted approval for this study (date: 21.03.2023, number: E-87347630-659-553803).

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Category 1	Concept/Design	P.D.D., C.H.O.
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RESEARCH ARTICLE

The impact of impulsivity and social anxiety on pathological gambling and technology addiction: A cross-sectional study

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ABSTRACT

Objective: With the introduction of the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders and changing life conditions, behavioral addictions have gained more prominence in academia. Behavioral addictions exhibit common and unique features, both in comparison to non-behavioral addictions and among different types of behavioral addictions. Pathological gambling or gambling disorder is included in the DSM-5 and can be considered the prototype of behavioral addiction. Therefore, in this study we aim to highlight the similarities and differences between pathological gambling and technology addictions in the context of impulsivity and social anxiety.

Method: In our study, 564 university students were included. Each student completed the South Oaks Gambling Screen, Technology Addiction Scale, Liebowitz Social Anxiety Scale, and the short form of the Barratt Impulsiveness Scale.

Results: The rate of pathological gambling was found to be 10.3% (n=58). According to the hierarchical regression analysis, impulsivity predicts both pathological gambling and technology addictions, while social anxiety predicts only technology addictions (including instant messaging addiction, online game addiction, and website addiction).

Conclusion: Behavioral addictions share characteristics with other behavioral addictions, as well as with non-behavioral addictions. However, there are unique factors in the development of each addiction that should be considered since identifying these factors can contribute to the development of personalized therapies. Therefore, there is a need for studies that focus on pathological gambling while comparing different behavioral addictions across various contexts. In this regard, the present study offers a modest example.

Keywords: Addictive behavior, gambling, impulsivity, social anxiety, technology addiction

INTRODUCTION

The concept of behavioral addiction is relatively novel in the field of psychiatry. It has gained increasing attention since the 2000s, leading to the inclusion of gambling disorder—also referred to as pathological gambling—in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (1, 2). However, behavioral addictions extend beyond pathological gambling, encompassing issues such as dysfunctional food consumption, compulsive sexual behavior, excessive exercise, and shopping abuse. These can

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manifest as food addiction, sex addiction, exercise addiction, and shopping addiction, respectively. Additionally, behaviors associated with the problematic use of specific devices and information and communication technologies, such as excessive internet use, or uncontrolled or excessive use of mobile phones or video games, can result in addiction-related disorders (3–5).

The core characteristic of behavioral addictions is an inability to resist impulses, drives, or temptations that, when excessively pursued, may lead to negative consequences. Despite awareness of these adverse outcomes, the behavior provides short-term rewards, reinforcing continued engagement (6). Griffiths (7) outlined six fundamental elements commonly observed in individuals with behavioral addiction: salience (the activity becomes highly valued, taking priority over other activities), mood modification (emotional responses occur due to the behavior, such as an adrenaline rush or relief from depressive states), tolerance (increasing engagement is needed to achieve the desired mood modification), withdrawal symptoms (unpleasant feelings or physiological reactions arise when reducing the frequency of or stopping the activity), conflict (the behavior interferes with other activities or relationships), and relapse (there is a relatively high likelihood of returning to the initial behavior).

Pathological gambling is the behavioral addiction with the most extensive evidence in the literature and was therefore the first behavioral addiction to be included in the Diagnostic and Statistical Manual of Mental Disorders (DSM). Research on gambling has indicated that being male, belonging to an ethnic minority, having disrupted family and peer relationships, and having a family member with pathological gambling disorder are risk factors for developing gambling-related problems, which often begin at an early age. Gamblers also frequently experience mental health issues such as anxiety and depression, exhibit lower levels of conformity and self-discipline, and often experience suicidal thoughts and attempts. Problem gamblers tend to hold misconceptions, have a poor understanding of event independence, and overestimate their gambling skills. They also demonstrate poor coping abilities, a tendency toward high-risk behavior, and reduced resilience in the face of adversity (3). Among all these factors, impulsivity stands out as the most critical and is considered a core feature of pathological gambling (8).

As technology advances, the prevalence of addictive behaviors linked to technological tools has grown. The World Health Organization (WHO) (9) has officially recognized technology addiction as a global issue. Griffiths (10) stated that technology addictions involve non-chemical, behavioral dependencies centered on human-machine interactions. These can manifest as passive activities, such as watching television, or active ones, such as using mobile phones. These technologies possess features that attract and reinforce behaviors, fostering addictive tendencies. Griffiths (11) also noted that within the broader category of technology addictions, there are various subtypes. Examples include internet addiction disorder, internet gaming disorder, mobile phone addiction, and social media addiction (5, 9, 12). Studies have indicated both a correlation and a regression relationship between impulsivity and technology addictions. Social anxiety has also been identified as a contributing factor influencing internet addiction (13–15).

Some researchers view behavioral addictions as a type of impulse control disorder, while other studies challenge this perspective by highlighting different psychological factors that contribute to each type of addiction (16). The existing literature on this topic continues to evolve. University students are particularly vulnerable and deserve closer examination due to various influencing factors, such as separation from their families, the ongoing development of coping mechanisms, relocation to new cities, and experiences of loneliness (17). As a modest contribution to the literature, this study aimed to examine the effects of impulsivity and social anxiety on pathological gambling and technology addiction scores in a single sample of university students. We hypothesized that impulsivity is a common factor influencing both pathological gambling and technology addictions, while social anxiety is associated with technology addictions but not with pathological gambling.

METHODS

Design

This descriptive, cross-sectional study aimed to identify certain psychological aspects of behavioral addictions (gambling and technology) among undergraduate students. The study was conducted in accordance with the Declaration of Helsinki. The study protocol was reviewed and approved by the Başakşehir Çam and Sakura City Hospital Clinical Research Ethics Committee (approval number: 2024-84, date: 10.07.2024).

Table 1: Sociodemographic characteristics and scale variables

Variable	n	%	Mean	SD	Min–Max
Age group (years)					
18–20	224	39.7			
21–23	256	45.4			
24–26	55	9.7			
>26	29	5.2			
Sex					
Female	232	41.1			
Male	332	58.9			
Average expenditure (₺)					
<9000	373	76.2			
>9000	191	33.8			
Gambling					
SOGS	564		2.47	3.31	0–17
SOGS (cut-off ≥8)	58	10.3			
Technology addiction					
SNAS	564		16.2	5.44	6–30
IMAS	564		15.8	5.33	6–30
OGAS	564		14.2	6.98	6–30
WAS	564		15.8	6.40	6–30
Total	564		62.0	19.0	24–120
Social anxiety					
LSAS - fear	563		42.7	11.7	24–91
LSAS - avoidance	563		41.1	11.2	24–88
LSAS - total	563		83.8	21.8	48–177
Impulsivity					
BIS-11 - non-planning	564		10.9	4.45	5–25
BIS-11 - motor	564		16.5	3.41	7–25
BIS-11 - attention	564		13.6	4.45	5–25
BIS-11 - total	564		40.9	9.12	18–68

SOGS: South Oaks Gambling Screen; SNAS: Social Network Addiction Scale; IMAS: Instant Messaging Addiction Scale; OGAS: Online Game Addiction Scale; WAS: Website Addiction Scale; LSAS: Liebowitz Social Anxiety Scale; BIS-11: Barratt Impulsiveness Scale; SD: Standard deviation; Min: Minimum; Max: Maximum; ₺: Turkish Lira.

Sampling and Participants

We focused on university students in Turkiye and used social media to recruit participants for the study. Data were collected in August 2024 using Google Forms. The survey link was distributed via Instagram and WhatsApp. There were no regional or university restrictions in recruiting participants. A total of 604 university students completed the forms online; however, 40 were excluded due to incomplete data. The exclusion criteria were: not providing consent to participate in the study, not being a university student, or submitting incomplete responses.

Measurements

South Oaks Gambling Screen (SOGS)

Developed by Lesieur and Blume in 1987 (18), this scale assesses pathological gambling behavior. It comprises 26 questions and is structured as a single-dimensional scale. Scores from 20 items are used to calculate the total score. Scores range from 0 to 20. Duvarcı and Varan (2021) (19) adapted the scale for Turkish culture in 2021. The cut-off point for the 19-item Turkish form of the SOGS, which yielded the lowest false negative and false positive rates, and thus the highest sensitivity and specificity, was determined to be a score of 8.

Table 2: Correlation analysis

		1	2	3	4	5	6	7	8	9	10
Gambling	SOGS	–									
Technology addiction	TAS total	0.184***	–								
	WAS	0.107*	0.792***	–							
	OGAS	0.241***	0.754***	0.395***	–						
	IMAS	0.101*	0.806***	0.536***	0.474***	–					
	SNAS	0.114**	0.800***	0.563***	0.425***	0.596***	–				
Social anxiety	LSAS fear	-0.104*	0.168***	0.160***	0.091*	0.148***	0.146***	–			
	LSAS avoidance	-0.073	0.184***	0.135**	0.131**	0.177***	0.148***	0.815***	–		
Impulsivity	BIS-11 non-planning	0.135**	0.179***	0.161***	0.075	0.137**	0.193***	0.020	0.012	–	
	BIS-11 motor	0.048	0.261***	0.218***	0.097*	0.265***	0.273***	0.001	0.016	0.052	–
	BIS-11 attention	0.141***	0.343***	0.273***	0.160***	0.324***	0.341***	0.078	0.109*	0.496***	0.353***

SOGS: South Oaks Gambling Screen; TAS Total: Technology Addiction Scale - Total; WAS: Websites Addiction Scale; OGAS: Online Game Addiction Scale; IMAS: Instant Messaging Addiction Scale; SNAS: Social Network Addiction Scale; LSAS: Liebowitz Social Anxiety Scale; BIS: Barratt Impulsiveness Scale. *p<0.05; **p<0.01; ***p<0.001.

Technology Addiction Scale (TAS)

Created by Aydın (2017) (20), this scale is based on the addiction criteria in Young's (1996) (21) Internet Addiction Test and Griffiths' (2000) (11) model, which includes six criteria. The TAS consists of 24 items on a five-point Likert scale and does not include any reverse-scored items. It comprises four subscales: the Social Network Addiction Scale (SNAS), Instant Messaging Addiction Scale (IMAS), Online Game Addiction Scale (OGAS), and Website Addiction Scale (WAS). Notably, a cut-off value has not yet been established for this scale.

Liebowitz Social Anxiety Scale (LSAS)

Developed by Liebowitz (1987) (22), the scale was later translated into Turkish by Soykan et al. (2003) (23). It includes 24 items, with participants rating both their levels of fear and avoidance in performance and social interaction situations. Fear is rated on a four-point scale from 0 (none) to 3 (severe), and avoidance is rated from 0 (never) to 3 (usually).

Barratt Impulsiveness Scale (BIS-11)

Originally developed by Barratt in 1995, a short form was later created (24). The BIS-11 short form (BIS-11-SF) comprises 15 items, each rated on a four-point scale (1 to 4). It includes three subscales: non-planning impulsiveness, motor impulsiveness, and attentional impulsiveness. A Turkish version of the scale was developed in 2013, with internal consistency reliability coefficients (Cronbach's alpha) reported as 0.82 for the overall scale, 0.80 for non-planning impulsiveness, 0.70 for motor impulsiveness, and 0.64 for attentional impulsiveness (25).

Statistical Analysis

The study data were analyzed using Jamovi version 2.3.28.0. For descriptive statistics, continuous quantitative variables were summarized using means and standard deviations, while frequencies and percentages were reported for qualitative variables. The Kolmogorov-Smirnov test was used to assess whether the continuous variables followed a normal distribution. Additionally, Pearson correlation analysis was conducted to examine relationships between variables, and hierarchical multiple regression analysis was performed to test the effects of social anxiety and impulsivity on pathological gambling and technology addictions. Standard regression analyses were also applied to all subscales.

Table 3: Regression analysis with total scores

Predicting pathological gambling					Predicting technology addiction				
Step	**R^2**	**Variable**	**Beta**	**p**	**Step**	**R^2**	**Variable**	**Beta**	**p**
1	0.141	Constant		<0.001	1	0.010	Constant		<0.001
		Sex[a]	0.644	<0.001			Sex[a]	0.169	0.052
		Avg. expenses[b]	0.315	<0.001			Avg. expenses[b]	0.092	0.307
2	0.180	Constant		0.401	2	0.180	Constant		<0.001
		Sex[a]	0.682	<0.001			Sex[a]	0.333	<0.001
		Avg. expenses[b]	0.303	<0.001			Avg. expenses[b]	0.083	0.317
		Impulsivity	0.195	<0.001			Impulsivity	0.358	<0.001
		Social anxiety	-0.038	0.329			Social anxiety	0.196	<0.001

a1: Female; 2: Male; b1: Low; 2: High.

RESULTS

In our study, 58.9% of the participants were male (n=332) and 41.1% were female (n=232). Age information was collected in four categories: 18-20 years, 21-23 years, 24-26 years, and above 26 years. Overall, 39.7% of the participants were in the 18-20 age range, and 45.4% were in the 21-23 age range. Average monthly expenditure information was collected using a dichotomous question to assess the impact of gambling behavior, and these data are presented in Table 1.

According to the SOGS, individuals with a score of 8 or above are considered likely to have a gambling addiction. In our study, this rate was 10.3% (n=58). The rate of technology addiction was not calculated, as there are no established cut-off scores for the TAS.

Correlation Analysis

Table 2 presents the Pearson correlations between different types of behavioral addictions (gambling, social media, messaging, gaming, and web use) and psychological parameters (social anxiety and impulsivity). Gambling was weakly correlated with the fear subscale of social anxiety, as well as with the attention and non-planning subscales of impulsivity. In contrast, technology addiction types, particularly social media, messaging, and web use, showed a moderate correlation with the attention subscale of impulsivity and a weak correlation with social anxiety and the other impulsivity subscales.

Regression Analysis

We conducted hierarchical linear regression analyses to examine the effects of impulsivity and social anxiety on pathological gambling and technology addictions. Two sets of regression models were used to evaluate both overall and specific addiction domains. In the first set of analyses, the dependent variables were pathological gambling and total technology addiction scores, analyzed separately. In Step 1, gender and monthly expenses were included as control variables. This model explained 14.1% of the variance in pathological gambling (R^2=0.141) and 1.0% of the variance in technology addiction (R^2=0.010). In Step 2, total impulsivity and total social anxiety scores were added as psychological predictors. This step significantly improved the model for both outcomes: for pathological gambling (R^2=0.180, ΔR^2=0.039, p<0.001) and for technology addiction (R^2=0.180, ΔR^2=0.170, p<0.001). Among the predictors, impulsivity significantly predicted both pathological gambling (β=0.195, p<0.001) and technology addiction (β=0.358, p<0.001). Social anxiety had a significant effect on technology addiction (β=0.196, p<0.001) but did not significantly affect pathological gambling (β=-0.038, p=0.329) (Table 3).

To gain a clearer understanding of the predictors, a second set of regression analyses was performed, using impulsivity subdimensions (attentional, motor, non-planning) and social anxiety subdimensions (social fear, social avoidance) as independent variables. The dependent variables for this model included pathological gambling and four specific domains of technology addiction: website addiction, online game addiction, instant messaging addiction, and social network addiction. The regression analyses indicated that pathological gambling was significantly predicted by both attentional impulsivity (β=0.131, p=0.007) and non-planning impulsivity (β=0.101, p=0.024). Regarding specific domains of technology addiction, website addiction was associated with higher levels of attentional impulsivity (β=0.182, p<0.001) and motor impulsivity (β=0.153, p<0.001), and increased

Table 4: Regression analysis for pathological gambling and technology addiction

Dependent variable	R^2	Predictor		Beta	p
Gambling disorder	0.182				0.401
			Sex[a]	0.686	<0.001**
			Avg. expenses[b]	0.305	<0.001**
		Impulsivity	Non-planning	0.101	0.024*
			Attentional	0.131	0.007**
			Motor	0.008	0.834
		Social anxiety	Fear	-0.093	0.157
			Avoidance	0.051	0.440
Social Network Addiction Scale (SNAS)	0.164		Constant		0.007
			Sex[a]	0.086	0.296
			Avg. expenses[b]	0.051	0.539
		Impulsivity	Non-planning	0.065	0.149
			Attentional	0.233	<0.001**
			Motor	0.186	<0.001**
		Social anxiety	Fear	0.098	0.143
			Avoidance	0.049	0.468
Instant Messaging Addiction Scale (IMAS)	0.164		Constant		0.004
			Sex[a]	0.167	0.043*
			Avg. expenses[b]	0.078	0.353
		Impulsivity	Non-planning	0.007	0.863
			Attentional	0.252	<0.001**
			Motor	0.176	<0.001**
		Social anxiety	Fear	0.040	0.548
			Avoidance	0.132	0.051
Online Game Addiction Scale (OGAS)	0.142		Constant		<0.001
			Sex[a]	0.632	<0.001
			Avg. expenses[b]	0.108	0.205
		Impulsivity	Non-planning	0.022	0.622
			Attentional	0.148	0.003**
			Motor	0.057	0.175
		Social anxiety	Fear	-0.014	0.830
			Avoidance	0.180	0.009**
Website Addiction Scale (WAS)	0.117		Constant		0.052
			Sex[a]	0.112	0.185
			Avg. expenses[b]	0.005	0.949
		Impulsivity	Non-planning	0.060	0.198
			Attentional	0.182	<0.001**
			Motor	0.153	<0.001**
		Social anxiety	Fear	0.163	0.018*
			Avoidance	-0.010	0.881

*p<0.05; **p<0.01; a1: Female; 2: Male; b1: Low; 2: High.

social fear (β=0.163, p=0.018). In the analysis of online game addiction, both social avoidance (β=0.180, p=0.009) and attentional impulsivity (β=0.148, p=0.003) emerged as significant predictors. Likewise, higher levels of attentional impulsivity (β=0.252, p<0.001) and motor impulsivity (β=0.176, p<0.001) predicted instant messaging addiction. Finally, social network addiction was significantly predicted by both attentional (β=0.233, p<0.001) and motor impulsivity (β=0.186, p<0.001) (Table 4).

DISCUSSION

Only a few studies have focused on comparing and contrasting behavioral addictions (16, 26, 27). However, changing living conditions and advancing technology necessitate a more comprehensive approach to research in this field. Since pathological gambling was the first behavioral addiction to be included in the DSM, it can serve as a reference point for evaluating other behavioral addictions (6).

In our research, 10.3% of the participating university students were identified as having pathological gambling (measured by SOGS ≥8). A meta-analysis of studies conducted between 1999 and 2005 using the SOGS method estimated the prevalence of pathological gambling among college students at 7.9% (28). Another meta-analysis of 18 studies conducted from 2005 to 2013 estimated that 10.23% of college students suffer from pathological gambling (29), while a 2018 meta-analysis reported that 10.23% of college students exhibit problematic gambling behaviors, and 6.13% meet the criteria for pathological gambling (30). The pathological gambling rate found in our study is consistent with these findings in the literature. However, since the TAS does not have a specific cut-off value, we did not calculate the prevalence of technology addictions.

Impulsivity is a common factor in behavioral addictions, characterized by hasty, risky, and inappropriate behaviors that lead to negative outcomes (31–33). In our study, we analyzed the relationship between impulsivity subdimensions (motor, non-planning, and attentional impulsiveness) and different types of addiction. The results indicated that pathological gambling is predicted by both attentional and non-planning impulsiveness. This may be because impulsivity is a core mechanism in the development of pathological gambling, which was previously categorized as an impulse control disorder in the DSM-IV (34). Various studies have shown different relationships between impulsivity subtypes and pathological gambling disorders. For instance, Yan et al. (2016) (35) found no significant positive associations between gambling scores and motor, attentional, or non-planning impulsiveness scores in logistic regression analysis. In contrast, Barrault and Bonnaire (2015) (36) reported significant differences in motor and non-planning impulsivity among gamblers, depending on the intensity of their gambling behavior. Donatella Marazziti et al. (2014) (37) found that both motor and non-planning impulsivity were significantly higher in patients with problem gambling than in control subjects. Furthermore, Frisone et al. (2020) (38) conducted a study during the Coronavirus Disease 2019 (COVID-19) pandemic and found significant associations between gambling scores and both attentional and non-planning impulsiveness. Overall, while some results align with our research, others differ regarding the specific impulsivity subtypes. Motor impulsiveness refers to acting without thinking or responding spontaneously. Attentional impulsiveness is characterized by difficulty in focusing on the task at hand. Non-planning impulsivity involves focusing on the present moment without considering future consequences (39). Our results highlight the cognitive component of impulsivity in pathologic gambling, rather than the behavioral component. Accordingly, medical and psychological support aimed at enhancing increase and present-moment awareness in individuals with pathologic gambling is becoming increasingly important.

A meta-analysis determined that the behavioral trait of impulsivity significantly and positively contributes to technology addiction behaviors and tendencies (40). Another meta-analysis, examining studies published up to 2019 on impulsivity and smartphone addiction, also found a strong positive correlation between impulsivity and smartphone addiction among student populations (41). However, we identified some variations in how different subtypes of impulsivity relate to specific addictions. Our results indicated that attentional and motor impulsivity are particularly prominent across the various forms of technology addiction (except in the case of online game addiction, which is predicted solely by attentional impulsivity) (42). Findings from a 2024 study conducted with university students revealed that motor impulsivity was associated with problematic internet use, problematic social media use, and problematic online gaming. Another study showed that individuals in the problematic smartphone use group had higher scores in attentional, motor, and non-planning impulsivity compared to the control group (43). When examining the relationships between various impulsivity subtypes and behavioral addictions such as pathological gambling and technology addiction, a complex and nuanced picture emerges, both from the literature and from our findings. Although we cannot draw definitive conclusions about the specific roles of these impulsivity subtypes based on the current data, it is clear that impulsivity is a significant predictor of all the behavioral addictions examined in our study.

In the regression model assessing the effects of psychological factors on pathological gambling and technology addictions, the explanatory power of impulsivity and social anxiety was found to be considerably higher for technology addiction (ΔR^2=0.033 vs. ΔR^2=0.163). Given the extensive body of literature on the impact of impulsivity on pathological gambling, this variance is somewhat unexpected. However, Zhou et al. (2016) (44) provided data that support our findings. In their study, BIS-11 scores were significantly higher in the internet addiction group than in the pathological gambling group. In another study (45), although BIS-11 scores were also higher among individuals with internet addiction compared to those with pathological gambling, the difference was not statistically significant. This finding, however, is supported by only a few studies, making it difficult to generalize. The unexpected results we observed, although supported by limited research, may stem from differences in the prevalence and social acceptance of the two types of addiction. Our study employed a dimensional approach, evaluating the data on a spectrum rather than categorically. Therefore, our findings should not be interpreted as assessments of pathological conditions. Conducting comparative studies that analyze both pathological gambling and technology addiction using categorical methods could help address this limitation.

According to our second hypothesis, social anxiety is associated with technology addictions but not with pathological gambling. The regression analysis supported this hypothesis. The number of studies examining the relationship between social anxiety and pathological gambling in the literature is limited. Nevertheless, one study examining the prevalence of anxiety disorders among individuals with pathological gambling disorders found a significantly higher proportion of social anxiety in this population (46). Another study investigating the severity of gambling problems and psychiatric disorders among Hispanic and White adults revealed that social phobia was associated with problem or pathological gambling in the Hispanic sample (47). Our regression analysis, however, showed that social anxiety has no significant effect on pathological gambling, although a small positive correlation was observed between them. These results suggest that the weak correlation found in the few available previous studies are not strong enough to be predictive.

In contrast, the relationship between social anxiety and technology addiction has been widely studied. For instance, a meta-analysis found that social anxiety is correlated with problematic internet use (48), while more recent meta-analyses have shown that social anxiety plays a predictive role in the development of problematic internet use and mobile phone addiction in both adolescents and adults (49, 50). The results of our regression analysis show a relationship between social anxiety and online game and website addictions, but not with social network or instant messaging addictions. Social media and messaging platforms require social interaction, whereas individuals with high social anxiety scores likely prefer online games and websites, which are more private. The predictive power of social anxiety for online game and website addictions indicates that, in addition to positive reinforcement, negative reinforcement also plays a role in technology addiction. This finding is particularly important for the behavioral treatment of technology-related addictions. Treating these addictions involves more than simply enhancing the ability to delay gratification. This study has some limitations. First, the data were collected using cross-sectional and self-report measures. Therefore, our findings should be compared with those of similar studies before any generalizations are made. Second, participant age was recorded using ordinal groupings. The narrow and partially homogeneous age range for the data collection group may have reduced the impact of this limitation; however, collecting data from such a limited age range makes it difficult to generalize our results. Third, the data were obtained from a non-clinical sample; therefore, the inferences made in our study need to be confirmed in clinical populations. Finally, as previously noted, the fact that the data on behavioral addiction types were evaluated as continuous rather than categorical, and that no diagnostic distinction was made, limited the inferences that could be drawn from the study.

CONCLUSION

In conclusion, considering both the literature and the findings of our study, impulsivity is associated with both pathologic gambling and technology addictions. The results highlight the importance of the cognitive component of impulsivity in the treatment of pathologic gambling. Clinicians should assess for social anxiety in individuals struggling with online gaming and website addiction, and appropriate treatment should be provided when necessary. Furthermore, more comprehensive and detailed studies are needed to better understand the mechanisms involved in the development and maintenance of behavioral addictions.

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Contribution Categories		Author Initials
Category 1	Concept/Design	F.B.A., Ö.A.
	Data acquisition	Ö.A.
	Data analysis/Interpretation	F.B.A.
Category 2	Drafting manuscript	F.B.A.
	Critical revision of manuscript	Ö.A., F.B.A.
Category 3	Final approval and accountability	F.B.A.
Other	Technical or material support	Ö.A.
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RESEARCH ARTICLE

The mediating role of mindfulness in the relationship between alexithymia and glycemic control in patients diagnosed with type 2 diabetes mellitus

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ABSTRACT

Objective: This study examines the impact of alexithymia and mindfulness on diabetes management, focusing on how their relationship affects glycemic control in patients with type 2 diabetes mellitus (T2DM). It evaluates the challenges posed by alexithymia in managing diabetes and the mediating role of mindfulness in this process.

Method: The study included 100 T2DM patients aged 18-65 who had been diagnosed for at least one year, alongside 100 healthy controls. Data were gathered through a sociodemographic form, the Toronto Alexithymia Scale (TAS-20), and the Mindful Attention Awareness Scale (MAAS). Glycemic control was assessed using hemoglobin A1c (HbA1c) levels.

Results: The prevalence of alexithymia in diabetic patients was 67%. Alexithymic individuals showed higher HbA1c levels and poorer blood sugar control ($p<0.001$). HbA1c levels were also significantly higher in those with lower mindfulness ($p<0.001$). A strong negative correlation was found between alexithymia and mindfulness ($r=-0.789$, $p<0.001$). TAS-20 scores significantly correlated with HbA1c ($\beta=0.508$, $p<0.001$), while higher MAAS scores were linked to better glycemic control ($\beta=-0.674$, $p<0.001$). When MAAS was included in the model, the direct relationship between TAS-20 and HbA1c lost significance ($\beta=-0.024$, $p=0.85$), indicating a mediating role of mindfulness.

Conclusion: Mindfulness was associated with better diabetes management and glycemic control and glycemic control in individuals with alexithymia symptoms. Incorporating mindfulness-based strategies into psychosocial interventions could enhance quality of life and treatment adherence for these patients, underscoring the need for a holistic approach to diabetes care.

Keywords: Alexithymia, diabetes mellitus, HbA1c, mindfulness

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder with increasing prevalence worldwide. Failure to control blood sugar levels can lead to long-term complications in individuals with T2DM. These complications can impact not only physical health but also mental health. It is estimated that more than 1.31 billion people will have diabetes by 2050, with age-standardized prevalence rates exceeding 10% in many

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regions (1). Among the psychosocial difficulties faced by patients with T2DM, alexithymia and changes in conscious awareness levels have an important place (2, 3). Alexithymia is defined as difficulty in recognizing, expressing, and understanding emotions. Chronic diseases such as diabetes can lead to significant changes in the emotional world of individuals, which can be associated with alexithymia. Alexithymic individuals have difficulty recognizing and expressing their emotional states, which can negatively affect disease management and overall quality of life (2). Rooted in deficits in affect regulation, social cognition, and interoceptive awareness, alexithymia has been associated with lower adherence to medical treatment, increased risk of complications, and diminished quality of life in patients with chronic diseases, including diabetes (4). While the present study focuses on the prevalence and impact of alexithymia within a diabetic population, it is important to note that alexithymia is not exclusive to medical contexts. A growing body of psychiatric literature identifies alexithymia as a transdiagnostic feature associated with emotional dysregulation across various psychiatric conditions. Recent studies have demonstrated strong links between alexithymia and bipolar disorder, particularly in relation to childhood trauma, impaired social cognition, and illness severity (5, 6).

Mindfulness is defined as an individual's ability to accept the present moment without judgment and is considered an important component of a healthy lifestyle (5). Mindfulness can increase individuals' ability to cope with stress, improve emotional regulation, and positively affect their overall health. In the context of diabetes, higher levels of mindfulness have been linked to better glycemic control, lower diabetes-related distress, and healthier lifestyle adherence (7). In diabetes management, increasing mindfulness can help patients better manage their own health and reduce disease-related stress (7). Importantly, growing evidence suggests an inverse relationship between mindfulness and alexithymia, with individuals high in alexithymia showing lower mindfulness. Multiple studies demonstrate that specific facets of mindfulness—such as acting with mindfulness, describing, observing, and non-judgment—are negatively correlated with alexithymia severity, suggesting that individuals with greater mindfulness skills are less likely to have difficulties identifying and describing emotions (6, 7). However, the joint impact of alexithymia and mindfulness on diabetes-related outcomes, particularly glycemic control, has not been sufficiently investigated. We hypothesized that mindfulness would mediate the relationship between alexithymia and glycemic control in individuals with type 2 diabetes mellitus. To address this gap, the present study aims to examine the relationship between alexithymia and mindfulness in individuals diagnosed with T2DM and to explore whether mindfulness mediates the relationship between alexithymia and glycemic control, as measured by HbA1c levels. By doing so, we hope to provide a more nuanced understanding of the psychological mechanisms underlying diabetes self-management and inform the development of integrative, psychosocially informed treatment strategies.

METHODS

Study Design and Sample

The study included 100 diabetic patients aged 18-65 who consecutively applied to the general internal medicine outpatient clinic of Recep Tayyip Erdogan University Training and Research Hospital (Rize, Turkiye) between 20.11.2021 and 20.05.2022, who had been diagnosed with T2DM for at least one year, and who agreed to participate in the cross-sectional study and met the inclusion criteria. The study inclusion criteria were meeting the diagnosis of T2DM, having no additional medical or neurological disease, not using psychotropic drugs for at least six months, not having an alcohol or substance use disorder, being between the ages of 18-65, not having a condition that prevents interviewing or administering the scale, and agreeing to participate in the study. All subjects participating in the study were informed about the study, and their written consent was obtained. The exclusion criteria for the study were not meeting the diagnosis of T2DM, having additional medical or neurological disease, use of psychotropic drugs within the past six months, having an alcohol or substance use disorder, being outside the age range of 18-65, having a condition that prevents interviewing or administering the scale, and not agreeing to participate in the study. The healthy control group of 100 people was composed of individuals who voluntarily agreed to participate in the study after being informed about its purpose and rationale, who had no previous or current history of psychiatric disease or treatment, who were hospital staff or patient companions, and who had similar characteristics to the patient group in terms of age, gender, and marital status.

Data Collection

Data were collected by the researchers by interviewing the patients in a suitable meeting room. The researcher verbally informed the patients about the research protocol, obtained verbal and written consent from the participants, and administered the questionnaire forms to those who agreed to participate. Completion of the questionnaire forms took an average of 30 minutes. In addition, the glycemic control parameters of the diabetic patients were obtained from the laboratory result documents regarding the measurements requested by their physicians during outpatient visits.

Measures

Questionnaire

A questionnaire form was prepared by the researchers using information from the literature to obtain data on the independent variables of the study, such as the sociodemographic characteristics of the patients and the clinical characteristics of the disease (duration of the disease, treatment used, complications).

Toronto Alexithymia Scale (TAS-20)

The Toronto Alexithymia Scale (TAS-20) is a 20-item self-report instrument developed by Bagby et al. (8) to assess alexithymic traits. The scale includes three subscales: DIF (Difficulty Identifying Feelings), DDF (Difficulty Describing Feelings), and EOT (Externally Oriented Thinking). Each item is rated on a 5-point Likert scale, and higher scores indicate greater alexithymic tendencies. In this study, individuals with a total TAS-20 score of 61 or above were classified as alexithymic, based on established cutoff criteria. The Turkish version of the scale, validated by Gulec et al. (9), has demonstrated good psychometric properties, with a total Cronbach's alpha of 0.78 and subscale alphas ranging from 0.57 to 0.80.

Mindful Attention Awareness Scale (MAAS)

The scale developed by Brown and Ryan (10) is used to measure people's awareness levels. The 6-point Likert-type scale, consisting of 15 items, is evaluated with a single total score. High scores indicate high conscious awareness. The internal consistency coefficient of the original scale was found to be 0.82, and the test-retest reliability was 0.81 (10). The scale was adapted into Turkish by Ozyesil et al. (11). The internal consistency coefficient of the Turkish version was 0.80, and the test-retest reliability was 0.86.

Blood Analyses

Hemoglobin A1c (HbA1c) levels were used to assess glycemic control. Venous blood was collected into ethylenediaminetetraacetic acid (EDTA) tubes for HbA1c analysis. The percentage of HbA1c in whole blood was measured using the Tosoh G8 high-performance liquid chromatography (HPLC) analyzer. According to the diagnostic criteria of the American Diabetes Association, diabetes was considered stable if the HbA1c value was <7% (12). For each participant, only a single HbA1c measurement was used to assess glycemic control, based on the most recent laboratory result available during outpatient evaluation.

Ethics Statement

The study's ethics committee approval was obtained from Recep Tayyip Erdogan University Non-Interventional Research Ethics Committee (Ethics Committee Decision Approval Date: 17.11.2021, Decision No: 2021/199). All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Statistical Analysis

To examine the difference between HbA1c values according to alexithymia levels between the groups, the required minimum sample size was calculated. The sample size calculation was performed using G*Power software (V. 3.1.9.2). In the power analysis, an α-error level of 0.05, 80% power (1-β), and an effect size of 0.45 (Cohen's d) were taken into account to reach statistical significance. Based on these parameters, the minimum sample size was calculated as n=152 to detect the difference between the groups. The effect size adopted was based on a previous study by Celik et al. (13) Data were analyzed using the Statistical Package for the Social Sciences (IBM Social Sciences Statistical Package SPSS, version 25.0) for Windows. The study data were evaluated using various descriptive statistical methods such as frequency, percentage, mean, and standard deviation. The Kolmogorov-Smirnov test was used to determine whether the variables were normally distributed. Categorical variables were compared using the Chi-square test. Independent samples t-test and one-way analysis of variance (ANOVA) were used for comparisons between groups. The homogeneity of the distribution of the data was assessed using the Levene test. When the data were homogeneously distributed, post

hoc analyses were performed using the Tukey test. Correlations between variables were determined using the Pearson correlation test. Whether awareness was a mediator variable in the relationship between diabetes mellitus and alexithymia was evaluated using mediator model regression analysis. P values less than 0.05 were considered statistically significant.

RESULTS

Sociodemographic and Clinical Characteristics of Participants

A total of 100 patients with type 2 diabetes mellitus (DM) and a control group of 100 were included in our study. No significant difference was found between the case and control groups in terms of age, gender, education status, marital status, employment status, place of residence, or income level (p>0.05) (Table 1). Of the patients participating in the study, 52% were female and 48% were male. The mean age was 55.66±9.71. Among the participants, 64% were married, 15% were single, 10% were widowed, and 11% were divorced. In terms of education, 6% of the patients were illiterate, 24% were primary school graduates, 19% were secondary school graduates, 39% were high school graduates, and 12% were university graduates. Regarding treatment, 61% of the patients were receiving only oral antidiabetic medication, 13% were receiving only insulin, and 26% were receiving both oral antidiabetic and insulin treatment. While 58% of the patients did not develop any complications, 18% developed nephropathy, and 18% developed neuropathy (Table 1).

Alexithymia Characteristics of DM Patients

In patients with DM, the mean TAS score (66.65±10.92) was found to be higher than the scale's cut-off score. In the control group, the mean score was lower (46.25±13.63). A statistically significant difference was found between the two groups. According to the cut-off value of the scale, 67% of the patients were found to exhibit alexithymia symptoms. The TAS subscale scores were also statistically higher in the DM patient group (p<0.001) (Table 1). The alexithymic features of the patients did not differ according to sociodemographic characteristics such as gender, age range, marital status, education level, employment status, place of residence, people with whom they live, family type, and income level (p>0.05). The relationship between the clinical features of the patients and alexithymic features was found to differ according to hospitalization, treatment, and HbA1 level (p<0.001) (Table 2). While the mean Body Mass Index (BMI) in alexithymic individuals was 37.13±3.61, it was 34.23±3.39 in those without alexithymia. The difference between the groups in terms of BMI was statistically significant (t=-3.84, p<0.001). When HbA1c values were examined, the mean HbA1c level of alexithymic individuals was 8.81±1.55 compared to 7.74±1.48 in those without alexithymia. The significance of this difference between the groups (t=-3.28, p<0.001) indicates that blood sugar control is poorer in individuals with alexithymia (Table 2).

Mindfulness Characteristics of DM Patients

While the mean MAAS score in patients with DM was 44.41±9.01, it was 67.08±9.95 in the control group. The mean score in the DM group was statistically lower than in the control group (p<0.001) (Table 1). MAAS scores of individuals with alexithymia were significantly lower compared to those without alexithymia (40.51±7.65 and 52.33±5.85, respectively; t=7.82, p<0.001) (Table 2). A negative correlation was also observed between MAAS and HbA1c (r=-0.655, p<0.01) (Table 3).

The Relationship Between Alexithymia and Mindfulness in DM Patients

The relationship between the MAAS scores of the participants and the TAS-20 scores was examined using Pearson correlation analysis. A significant negative correlation was found between the MAAS scores and the TAS-20 scores (r=-0.789; p<0.00). The mean MAAS score of alexithymic patients (40.5±7.6) was lower than that of non-alexithymic patients (52.3±5.8, p<0.001). There was also a significant negative correlation between DIF and MAAS (r=-0.732, p<0.01). The DIF (r=-0.456, p<0.01) and EOT (r=-0.663, p<0.01) subscales also showed negative correlations with MAAS (Table 3).

Relationship Between Alexithymia and Glycemic Control in DM Patients

A significant positive correlation was found between TAS-20 total and subscale scores and HbA1c levels (r=+0.508; p<0.01). A significant positive correlation was found between Difficulty Identifying Feelings and HbA1c levels (r=+0.416; p<0.00). A significant positive correlation was also found between Difficulty Describing Feelings and HbA1c levels (r=+0.37; p<0.01) (Table 3).

Table 1: Demographic characteristics of the participants and MAAS, TAS-20 total and subscale scores

Variables	Patients (n=100)	Control (n=100)	Total (n=200)	Statistics	p
Gender, n (%)				χ^2=0.02[a]	0.887
Woman	52 (52)	51 (51)	103 (51.5)		
Man	48 (48)	49 (49)	97 (48.5)		
Marital status, n (%)				χ^2=1.144[a]	0.766
Single	15 (15)	20 (20)	35 (17.5)		
Married	64 (64)	63 (63)	127 (63.5)		
Divorced	10 (10)	8 (8)	18 (9)		
Widowed	11 (11)	9 (9)	20 (10)		
Education level, n (%)				χ^2=4.195[a]	0.38
Illiterate	6 (6)	3 (3)	9 (4.5)		
Primary education	24 (24)	30 (30)	54 (27)		
Secondary education	19 (19)	16 (16)	35 (17.5)		
High school	39 (39)	32 (32)	71 (35.5)		
University	12 (12)	19 (19)	31 (15.5)		
Working status, n (%)				χ^2=4.485[a]	0.344
Public	11 (11)	11 (11)	22 (11)		
Private	9 (9)	12 (12)	21 (10.5)		
Free	18 (18)	14 (14)	32 (16)		
Retired	32 (32)	22 (22)	54 (27)		
Unemployed	30 (30)	41 (41)	71 (35.5)		
Income level, n (%)				χ^2=3.713[a]	0.294
Bad	18 (18)	29 (29)	47 (23.5)		
Middle	42 (42)	33 (33)	75 (37.5)		
Good	27 (27)	26 (26)	53 (26.5)		
Very good	13 (13)	12 (12)	25 (12.5)		
Family type, n (%)				χ^2=0.452[a]	0.502
Large family	25 (25)	21 (21)	46 (23)		
Core family	75 (75)	79 (79)	154 (77)		
People living with, n (%)				χ^2=3.938[a]	0.268
Spouse and children	66 (66)	62 (62)	128 (64)		
Parents	11 (11)	20 (20)	31 (15.5)		
Caregiver	21 (21)	15 (15)	36 (18)		
Alone	21 (21)	15 (15)	36 (18)		
Place of residence, n (%)				χ^2=0.231[a]	0.631
Countryside	28 (28)	25 (25)	53 (26.5)		
City	72 (72)	75 (75)	147 (73.5)		
Age, Mean (SD)	55.66 (9.71)	55.01 (10.11)	55.42 (9.89)	t=0.335	0.738b
MAAS, Mean (SD)	44.41 (9.01)	67.08 (9.95)	55.74 (14.79)	t=-16.879	**<0.001[b]**
TAS-20, Mean (SD)	66.65 (10.92)	46.25 (13.63)	56.45 (16.01)	t=11.673	**<0.001[b]**
DIF, Mean (SD)	22.54 (4.34)	15.66 (5.24)	19.1 (5.91)	t=10.101	**<0.001[b]**
DDF, Mean (SD)	17.02 (3.22)	12.09 (4.53)	14.55 (4.63)	t=8.859	**<0.001[b]**
EOT, Mean (SD)	26.48 (5.74)	18.73 (6.73)	22.6 (7.35)	t=8.751	**<0.001[b]**

MAAS: Mindfulness Attention Awareness Scale; TAS-20: Toronto Alexithymia Scale; DIF: Difficulty Identifying Feelings; DDF: Difficulty Describing Feelings; EOT: Externally-Oriented Thinking; n: Number; SD: Standard deviation; a: Chi-Square Test for the comparison between study groups; b: Student's t Test for the comparison between study groups.

Table 2: Clinical features, MAAS, TAS-20 total and subscale scores in patients with and without alexithymia

Variables	Patients with alexithymia 33 (33%)	Patients without alexithymia 67 (67%)	Statistics	p
Treatment, n (%)			χ^2=13.225[a]	**<0.001**
OAD	28 (45.9)	33 (54.1)		
Insulin	0 (0)	13 (100)		
OAD+Insulin	5 (19.2)	21 (80.8)		
Hospitalization, n (%)			χ^2=12.183[a]	**<0.001**
Yes	7 (15.2)	39 (84.8)		
No	26 (48.1)	28 (51.9)		
Complication, n (%)			χ^2=6.831[a]	0.233
No	22 (37.9)	36 (62.1)		
Nephropathy	8 (44.4)	10 (55.6)		
Neuropathy	3 (16.7)	15 (83.3)		
Retinopathy	0 (0)	1 (100)		
Neph+Neu	0 (0)	4 (100)		
Neph+Ret	0 (0)	1 (100)		
HbA1c %, n (%)			χ^2=17.739[a]	**<0.001**
<7	13 (76.5)	4 (23.5)		
7–9	14 (25.9)	40 (74.1)		
>9	6 (20.7)	23 (79.3)		
Age, Mean (SD)	56.9 (9.49)	53.15 (9.82)	t=-1.834[b]	0.07
BMI, Mean (SD)	37.13 (3.61)	34.23 (3.39)	t=-3.846[b]	**<0.001**
HbA1c, Mean (SD)	8.81 (1.55)	7.74 (1.48)	t=-3.288[b]	**<0.001**
MAAS, Mean (SD)	40.51 (7.65)	52.33 (5.85)	t=7.821[b]	**<0.001**
TAS-20, Mean (SD)	72.7 (7.41)	54.36 (4.87)	t=-12.89[b]	**<0.001**
DIF, Mean (SD)	24.48 (3.69)	18.61 (2.56)	t=-8.201[b]	**<0.001**
DDF, Mean (SD)	18.09 (2.8)	14.85 (2.97)	t=-5.335[b]	**<0.001**
EOF, Mean (SD)	29.3 (4.31)	20.76 (3.67)	t=-9.764[b]	**<0.001**

OAD: Oral antidiabetic; Neph: Nephropathy; Neu: Neuropathy; Ret: Retinopathy; MAAS: Mindfulness Attention Awareness Scale; TAS-20: Toronto Alexithymia Scale; DIF: Difficulty Identifying Feelings; DDF: Difficulty Describing Feelings; EOT: Externally Oriented Thinking; BMI: Body Mass Index; a: Chi-Square Test for the comparison between study groups; b: Student's t Test for the comparison between study groups.

Associated Factors of HbA1c in DM Patients

In Table 4, tolerance, variance inflation factor (VIF), and condition index (CI) findings were examined to determine whether there was a multicollinearity problem among the independent variables, one of the prerequisites of multiple linear regression analysis. The results showed that there was no multicollinearity problem. In addition, whether the error values of the independent variables were independent of each other (autocorrelation problem) was examined using the Durbin-Watson value. The determined value of 1.869 indicated that there was no autocorrelation problem. Again, whether there were extreme values in the data was evaluated using Cook's distance. Since the largest value did not exceed 1 (max=0.001), it was concluded that there were no extreme values. When the regression findings in Table 4 were examined, the established model was found to be significant (F (6.93)=26.141; p=0.000), and the independent variables explained 62.8% of the change in the dependent variable (Adj. R^2). When the effects of the variables were examined in detail, it was found that MAAS and BMI significantly affected HbA1c levels ($p<0.05$), whereas DIF, DDF, EOF, and disease duration did not significantly affect HbA1c levels ($p>0.05$). MAAS negatively affected HbA1c, and a 1-unit increase in MAAS resulted in a 0.106-unit decrease in HbA1c (95% confidence interval: -0.146 to -0.067). BMI positively affected HbA1c, and a 1-unit increase in BMI resulted in a 0.206-unit increase in HbA1c (95% confidence interval: 0.141-0.272).

Table 3: Correlations (Pearson's r) for study variables

Variable	MAAS	TAS-20	DIF	DDF	EOT	HbA1c	Disease duration (years)	Age	BMI
MAAS	1								
TAS-20	-0.789**	1							
DIF	-0.732**	0.923**	1						
DDF	-0.456**	0.795**	0.688**	1					
EOT	-0.663**	0.867**	0.709**	0.534**	1				
HbA1c	-0.655**	0.508**	0.416**	0.370**	0.460**	1			
Disease duration (years)	-0.210*	0.042**	0.004	-0.066	0.082	0.247*	1		
Age	-0.146	0.188	0.150	0.085	0.235	0.162	0.501**	1	
BMI	-0.461**	0.541**	0.411**	0.386**	0.511**	0.659**	0.088	0.094	1

MAAS: Mindfulness Attention Awareness Scale; TAS-20: Toronto Alexithymia Scale; DIF: Difficulty Identifying Feelings; DDF: Difficulty Describing Feelings; EOT: Externally-Oriented Thinking; BMI: Body Mass Index; *: Correlation is significant at the 0.05 level (2-tailed); **: Correlation is significant at the 0.01 level (2-tailed).

Table 4: Multiple regression analysis of HbA1c level

Variables	b	SE	ß	t	p	95% CI		Tolerance	VIF
						Lower	Upper		
Constant	7.36	2.076		3.546	0.001	3.328	11.482		
MAAS	-0.106	0.020	-0.599	-5.389	**<0.001**	-0.146	-0.067	0.324	3.090
DIF	-0.075	0.038	-0.203	-1.948	0.054	-0.151	0.001	0.370	2.700
DDF	0.027	0.041	0.055	0.667	0.506	-0.054	0.108	0.597	1.676
EOT	-0.027	0.026	-0.097	-1.053	0.295	-0.078	0.024	0.474	2.109
Disease duration (years)	0.026	0.019	0.091	1.358	0.178	-0.012	0.065	0.889	1.125
BMI	0.206	0.033	0.487	6.241	**<0.001**	0.141	0.272	0.658	1.520

VIF: Variance inflation factor; MAAS: Mindfulness Attention Awareness Scale; TAS-20: Toronto Alexithymia Scale; DIF: Difficulty Identifying Feelings; DDF: Difficulty Describing Feelings; EOT: Externally-Oriented Thinking; BMI: Body Mass Index; SE: Standard error; CI: Confidence interval; F(6.93)=26.141; p=0.000; Adj. R^2: 0.628; Durbin-Watson=1.869.

Table 5: Mediator role of MAAS in the relationship between TAS-20 and HbA1c

Predicted variable	Predictor variable	R	R^2	Radj	B	SE	Beta	t	F	p
HbA1c	TAS-20	0.508	0.258	0.251	0.074	0.013	0.508	5.84	34.15	**<0.001**
MAAS	TAS-20	0.789	0.623	0.619	-0.651	0.051	-0.789	-12.72	161.82	**<0.001**
HbA1c	MAAS	0.656	0.43	0.418	-0.012	0.022	-0.674	-5.4	36.56	**<0.001**
HbA1c	TAS-20	0.656	0.43	0.418	-0.003	0.018	-0.024	-0.19	36.56	0.85

SE: Standard error; MAAS: Mindfulness Attention Awareness Scale; TAS-20: Toronto Alexithymia Scale.

The Mediating Role of Mindfulness in the Relationship Between Glycemic Control and Alexithymia

To examine the mediating role of conscious mindfulness in the relationship between alexithymia and glycemic control, regression analyses were applied to the data. The model illustrating the relationship between the predictor variable (TAS-20), the predicted variable (HbA1c), and the mediator variable is illustrated in Figure 1. First, TAS-20 scores were entered into the equation as the predictor of HbA1c values, as shown in Figure 1. TAS-20 scores (β=0.508, b=0.074, p<0.001) were found to be a significant positive predictor of HbA1c (Table 5). TAS-20 explained 25% of the variance in the dependent variable (HbA1c) (R^2=0.25, F (34, 152)=65.59, p<0.001) (Table 5). Second, regression analysis was applied to examine the effect of TAS-20 scores on the mediator variable, MAAS scores. TAS-20 (β=-0.789, b=-0.651, p<0.01) significantly and negatively predicted the mediator variable, MAAS scores (Table 5). TAS-20 explained 62% of the variance in MAAS scores

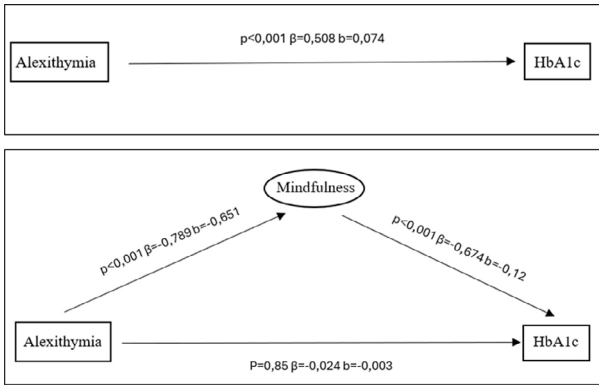

Figure 1. Structural equation modeling of the mediating role of mindfulness in the relationship between alexithymia and HbA1c.

(R^2=0.61, F (161.828)=5011.393, p<0.001) (Table 5). Finally, when TAS-20 scores and the mediator variable MAAS were simultaneously entered into the equation, MAAS was found to be a significant negative predictor of HbA1c values (β=-0.674, b=-0.12, p<0.001), while the significance of the relationship between TAS-20 scores (β=-0.024, b=0.003, p=0.85) and HbA1c was lost (F36.56)=54.54, p<0.001) (Table 5, Fig. 1).

DISCUSSION

Our study investigates the mediating role of mindfulness in the effect of alexithymia on glycemic control in a sample of diabetic patients and controls, based on the relationship between alexithymia and diabetes. To our knowledge, this is the first study to test the mediating role of mindfulness in the relationship between glycemic control and alexithymia. In our study, the prevalence of alexithymia was found to be 67% among patients with diabetes. Another study conducted in Turkiye in 2006 reported a prevalence rate of 65% in patients with diabetes (13). In another study conducted in 2022, this rate was determined as 63.9% (14). The prevalence of alexithymia in patients with type 2 diabetes mellitus varies between 25% and 75%. In reality, the prevalence of alexithymia varies among studies. This variability can reach up to 75%, depending on study designs and measurement tools, as well as the sociodemographic characteristics, geographical determinants, and cultural factors of the participants (15). This high prevalence is important because alexithymia is associated with poorer glycemic control and increased psychological distress. A systematic review by Martino et al. (3) reported that individuals with T2DM and alexithymia tend to have higher HbA1c and fasting glucose levels, indicating poorer glycemic control and an increased risk of diabetes-related complications. In patients with T2DM, alexithymic features have also been linked to hospitalization and the presence of diabetes-related complications. The higher prevalence of alexithymic features in patients with T2DM may therefore be related to both hospitalization of these patients and the presence of diabetes-related complications. Martino et al. (3) stated that alexithymic patients with T2DM generally have higher HbA1c and fasting blood glucose levels, indicating poorer glycemic control, which may lead to increased hospitalizations and complications. Additionally, Celik et al. (13) reported that alexithymia in diabetic patients was associated with lower perceived social support and poorer glycemic control, which in turn contributed to a greater risk of complications and hospitalizations. Mnif et al. (16) found that alexithymia in patients with T2DM increases the likelihood of complications requiring hospitalization, which can further exacerbate diabetes management difficulties. One of the important goals in diabetes management is to keep HbA1c, a parameter of glycemic control, at normal levels. However, various psychological and social factors, including alexithymia, play different roles in achieving glycemic control (14). In this study, it was found that the alexithymia levels of the participants were positively correlated with their HbA1c levels, and those with alexithymia symptoms had higher HbA1c levels. In parallel with this study, many previous studies have also determined that patients with alexithymia symptoms had poorer glycemic control (9, 11, 13). Luca et al. (17) showed that alexithymic patients with T2DM had significantly higher HbA1c levels compared with non-alexithymic patients (7.7±1.5 vs. 7±1.5, p=0.016), indicating poorer glycemic control. This study also found that the presence of alexithymia was a stronger predictor of poor glycemic control than depression (17). Gan et al. (18) found a significant positive correlation between alexithymia and HbA1c levels in patients with T2DM. The finding that nearly two-thirds of diabetic patients showed symptoms of alexithymia in our study is noteworthy in terms of demonstrating the prevalence of alexithymia. This situation is of great importance because it directly affects the capacity of diabetic patients to manage their disease and prevents them from receiving effective care and treatment. An important aspect of our findings concerns the distinct contributions of the TAS-20 subscales. The DIF subscale demonstrated the strongest positive correlation with HbA1c levels, suggesting that specific deficits in emotional awareness may be more

closely tied to impaired glycemic regulation than other alexithymic features. This aligns with prior research indicating that emotional unawareness may interfere with illness self-monitoring and appropriate behavioral responses to physiological cues. Additionally, the EOT subscale showed a strong negative correlation with mindfulness (r=-0.663), reinforcing the theoretical opposition between externally directed cognitive styles and mindful present-moment awareness. These differential patterns suggest that tailored psychological interventions targeting specific facets of alexithymia—such as enhancing emotional awareness and reducing cognitive detachment—may be beneficial in improving diabetes self-management outcomes.

Mindfulness refers to focusing an individual's attention on the present moment without judgment and with acceptance. This skill can have positive effects on disease management in chronic diseases such as diabetes. Lower mindfulness scores were observed in patients with T2DM compared to the healthy control group. In addition, a negative relationship was found between mindfulness levels and HbA1c levels, with higher HbA1c levels in those with low mindfulness levels. The relationship between diabetes and mindfulness has been investigated in many studies. Loucks et al. (19) found that higher MAAS scores were associated with better glucose regulation, indicating that higher mindfulness may contribute to better metabolic control in individuals with diabetes. They also suggested that lower mindfulness may contribute to poorer metabolic control and potentially higher hospitalization and complication rates (19). This suggests that lower levels of mindfulness may be linked to poorer glucose regulation in patients with diabetes. Kiken et al. (20) found that lower levels of mindfulness, particularly during times of difficulty managing diabetes, were associated with higher accuracy in blood glucose predictions in patients with diabetes, suggesting that mindfulness is a crucial factor for effective diabetes management. Fanning et al. (21) reported that higher mindfulness was associated with better dietary behaviors in adults with type 2 diabetes. This suggests that lower mindfulness may negatively impact dietary habits, contributing to poorer glycemic control and an increased risk of complications (22). The American Diabetes Association's Standards of Care for Diabetes-2024 recommends integrating mindfulness-based interventions into diabetes self-management education and support programs and highlights their potential benefits in reducing diabetes distress and improving glycemic control (22).

In our study, higher mindfulness scores were significantly associated with lower alexithymia levels. Defined as difficulty identifying and describing emotions, alexithymia has been linked to deficits in interoceptive mindfulness and emotion regulation. Tamanaeifar et al. (23) found that mindfulness traits significantly predicted lower levels of alexithymia among university students (23). Similarly, a study conducted by Kumari et al. (24) found a negative correlation between dispositional mindfulness and alexithymia, with individuals demonstrating higher mindfulness exhibiting fewer alexithymic traits (24). In our study, high levels of mindfulness were also associated with low alexithymia in patients with T2DM. Aaron et al. (25) also stated that mindfulness interventions can increase interoceptive mindfulness, which is frequently impaired in individuals with alexithymia. Additionally, Liu et al. (26) determined that mindfulness mediates the relationship between self-control and alexithymia and suggested that increasing mindfulness could potentially reduce alexithymia in medical students. Overall, higher levels of mindfulness are associated with lower levels of alexithymia in diabetic patients. This finding highlights the importance of integrating mindfulness-based practices into the holistic management of diabetes.

The full mediating role of mindfulness in the relationship between alexithymia and glycemic control provides important insight into how these two variables affect each other. Alexithymia is a personality trait that reflects the inability of individuals to recognize and express emotions, and this deficiency can also complicate self-care processes such as diabetes management. Studies have shown that alexithymic individuals have higher HbA1c levels, indicating inadequate glycemic control (13). In our study, patients with alexithymic features were also found to have worse glycemic control. This demonstrates a direct relationship between alexithymia and glycemic control. On the other hand, mindfulness is an important factor in emotional regulation and stress management. It has been shown that mindfulness-based interventions can reduce HbA1c levels and improve emotional well-being in patients with diabetes (3, 17). Mindfulness can enhance the internal accuracy necessary for managing diabetes by increasing individuals' body mindfulness, enabling them to make more informed decisions about their blood sugar levels (20). The mediating role of mindfulness in the relationship between alexithymia and glycemic control can be explained through its

effects on emotional regulation and stress reduction. Alexithymic individuals generally have poor stress-coping skills, which may negatively affect glycemic control. Mindfulness practices may help individuals become more aware of their emotional states and improve their stress coping skills (21). Reducing stress and increasing emotional mindfulness may allow individuals to be more effective in managing diabetes and more compliant with self-care behaviors (19). Individuals with alexithymia are less aware of their condition due to their inability to identify and describe emotions (27). Moreover, these individuals cannot concentrate on present experiences (28). In conclusion, mindfulness appears to be an important factor mediating the relationship between alexithymia and glycemic control. Mindfulness-based interventions may improve diabetes self-management and positively influence glycemic control by improving emotional regulation skills and reducing stress in individuals with alexithymia. These findings highlight the potential benefits of integrating mindfulness-based programs into clinical practice for individuals with diabetes and alexithymia.

To our knowledge, this is the first study to examine the mediating role of mindfulness in the relationship between alexithymia and glycemic control in patients with diabetes. This study also offers a different perspective on achieving glycemic control in parallel with the increasing prevalence of diabetes. However, this study has several limitations. The most important limitation is that it was conducted in a single institution during a specific time period and with patients who applied to this institution due to diabetes; therefore, the results of this study cannot be generalized. A second limitation of this study is that the information collected regarding alexithymia and mindfulness levels among the participants was based on the self-reports of these participants. Another limitation is that this study has a cross-sectional design and only explains the relationship between alexithymia, mindfulness, and glycemic control variables. However, longitudinal studies can more clearly reveal the cause-effect direction of the relationship between these variables and the dynamics between them. The mediation analysis was conducted using the Baron and Kenny method, which offers a clear and interpretable framework for exploratory research. Although this approach has known limitations—such as reduced statistical power—it was chosen due to the study's moderate sample size and cross-sectional design. Future studies are encouraged to replicate these findings using more robust techniques such as bootstrapping or structural equation modeling. Another limitation of this study is the lack of formal assessment for psychiatric comorbidities such as depression and anxiety. Although individuals with known psychiatric diagnoses or psychotropic medication use were excluded, undiagnosed psychiatric conditions may have been present and could have influenced levels of alexithymia, mindfulness, and glycemic control. Given the well-established associations between these comorbidities and the psychological variables examined, their omission represents a potential confounding factor. Future research should incorporate standardized psychiatric screening tools to more accurately account for these influences. It is recommended that future studies be conducted with larger and more diverse sample groups and use different data collection methods.

CONCLUSION

This study highlights an association between mindfulness, alexithymia, and glycemic control in patients with type 2 diabetes. Individuals with higher alexithymia scores tended to exhibit poorer glycemic control, while lower mindfulness levels were associated with higher HbA1c values. Mindfulness appeared to mediate the relationship between alexithymia and glycemic control. These findings underscore the potential relevance of psychosocial factors in diabetes management. However, given the observational nature of the study, these results should be considered preliminary and associative rather than causal. Future research, including longitudinal and interventional studies, is needed to clarify the directionality and underlying mechanisms of these relationships. Nevertheless, incorporating assessments of alexithymia and mindfulness into comprehensive diabetes care may help inform tailored psychosocial interventions aimed at improving patients' quality of life and metabolic outcomes.

Ethical Approval: The Recep Tayyip Erdogan University Non-Interventional Ethics Committee Research Ethics Committe granted approval for this study (date: 17.11.2021, number: 2021/199).

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	Data acquisition	S.D., D.S.
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RESEARCH ARTICLE

Validity and reliability study of the Turkish version of the Addiction Severity Index

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ABSTRACT

Objective: The increasing prevalence of alcohol and substance use disorders (ASUD) worldwide has raised the demand for more efficient treatment and monitoring. Comprehensive assessment tools are crucial for evaluating substance use, as well as medical, legal, and psychosocial aspects to provide holistic care. The Addiction Severity Index (ASI) is a commonly used tool to assess these dimensions. The purpose of this research is to validate the ASI-Treatnet version in a sample from Turkiye.

Method: The research was carried out at AMATEM clinics in Istanbul and Antalya, involving 141 patients who had been diagnosed with ASUD based on the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria. The ASI was translated into Turkish, and its reliability and validity were assessed through a methodology that included testing for test-retest and interrater reliability using Spearman-Brown correlation coefficients.

Results: The results indicated high reliability for all subscales. Internal consistency was assessed through Cronbach's alpha, resulting in an acceptable value of 0.82. Concurrent validity was established by examining the correlations with the Michigan Alcoholism Screening Test, the Drug Abuse Screening Test, and the Beck Depression Inventory, all of which demonstrated significant correlations with the ASI subscales.

Conclusion: The study revealed that the Turkish adaptation of the ASI is a reliable and valid instrument for evaluating ASUD. Its strong correlations with established screening tools confirm its concurrent validity. The ASI's multidimensional approach allows for a comprehensive assessment, facilitating individualized treatment planning and monitoring. Future research could explore expanded and online-adapted versions of the ASI to enhance its practicality.

Keywords: Addiction Severity Index, reliability, validity, Turkish population

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INTRODUCTION

Alcohol and substance use disorders (ASUD) and the use of over-the-counter (OTC) drugs have become major public health problems worldwide in recent years. As this global problem grows, so does the need for effective treatment and follow-up. Early comprehensive evaluation, individualized intervention strategies, and consistent monitoring have been proven successful in managing ASUD (1). Besides evaluating substance use characteristics, it is essential to also consider the medical, legal, and psychosocial aspects of patients to ensure appropriate referrals to other needed services as part of the treatment and follow-up plan (2). A comprehensive and multidimensional evaluation is necessary for gaining insight into patients' requirements, establishing individualized treatment objectives, monitoring treatment progress, assessing results, and understanding the effectiveness of treatment (3, 4). Using standardized assessment tools also allows for the comparison of treatment programs and their results on a national and international scale (3).

Early diagnosis and intervention in alcohol and drug use disorders play a crucial role in mitigating the harmful impact on the lives of individuals and society. Practical and valid screening tests are available for early diagnosis and identification of possible risk situations. The Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) is a practical scale that has been used effectively to screen and diagnose addiction (4). Nevertheless, to acquire precise and thorough information regarding the extent of addiction, it is essential to utilize additional scales. When diagnosing ASUD, it is crucial to have a scale that specifically measures the severity of addiction. Additionally, the evaluation of severity is known to be helpful in predicting prognosis, assessing treatment outcomes, and planning the level of treatment required (5).

The Addiction Severity Index (ASI) is one of the most commonly used assessment tools in addiction treatment and clinical trials. Developed by McLellan (6) and colleagues approximately four decades ago, mainly for research purposes, this scale has been extensively utilized in treatment facilities and clinical studies in the United States (USA) and later on a global scale. Additionally, it has been translated and adjusted for application in various languages and nations (7).

McLellan and his team underscored the necessity of a more comprehensive assessment to enhance our understanding of addiction. They also emphasized the importance of considering alcohol- and substance-using patients holistically, rather than solely focusing on their patterns of use. Alcohol and drug use disorders can lead to significant legal problems as well as psychiatric, physical, and social impairments (1). Therefore, they highlighted the need for a more extensive evaluation because of the health, social, and legal issues that arise as a direct consequence of the addiction process (8). As a semi-structured interview, the ASI assesses seven areas related to ASUD. These are medical status; employment and support; alcohol, drug, and medication use; legal status; family and social functioning; and psychiatric disorders (2). The ASI is a comprehensive interview that can be utilized for admission to treatment as well as for monitoring recovery and change during follow-up. In a study of 310 patients in methadone maintenance treatment for two years, Bovasso and colleagues showed that the multidimensional structure of the ASI is sensitive and specific to the problems in the domains measured (9). Hubicka and colleagues also found that the ASI profile has prognostic value for relapse (10).

During the diagnosis and treatment of ASUD, the ASI has been modified to be utilized at every stage due to its capacity to assess the issues identified. These revisions allow the scale to remain relevant at all times (8). The ASI-Treatnet version is an updated version of the ASI adapted to different cultures and life experiences (11). The aim of this study is to develop the Treatnet version of the Addiction Severity Index that can be used as a standard assessment tool in the Turkish sample of patients diagnosed with alcohol and substance use disorders.

METHODS

Study Setting

The study was conducted at the inpatient and outpatient AMATEM clinics (Research, Treatment, and Training Center for Alcohol and Substance Use) of Erenköy Mental and Neurological Diseases Training and Research Hospital, and also Ataturk State Hospital, Antalya. The AMATEM clinic of Erenköy Mental and Neurological Diseases Training and Research Hospital provides outpatient and inpatient detoxification treatment, long-term psychotherapeutic interventions, and psychosocial rehabilitation services for addiction in Istanbul. The treatment team consists of a multidisciplinary team including psychiatrists, clinical psychologists, social

workers, and nurses. Treatment is voluntary, and a comprehensive assessment is made for each patient to determine the need for inpatient or outpatient treatment and appropriate pharmacological and psychosocial interventions.

Sample Selection

The study was conducted in a cross-sectional and methodological manner, involving 141 patients who were between the ages of 18-65 and had been diagnosed with alcohol and/or substance use disorder based on the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria. These patients were undergoing outpatient or inpatient treatment at addiction treatment centers in two prominent cities in Turkiye – Istanbul and Antalya. The diagnosis of alcohol and/or substance use disorder was made by a psychiatrist. Participants were included in the study consecutively from June 1, 2022 to December 31, 2022. Intellectual disability, cognitive dysfunction, and general medical condition were identified as exclusion criteria. The study received ethical committee approval from the Clinical Research Ethics Committee of Erenköy Mental and Neurological Diseases Training and Research Hospital, Istanbul (20.06.2022/34). It was conducted in accordance with the Declaration of Helsinki and the guidelines of International Good Clinical Practices. Informed consent was obtained from all patients for inclusion in the study.

Method

Upon providing written informed consent, participants completed a demographic information form, the Michigan Alcoholism Screening Test (MAST), the Drug Abuse Screening Test (DAST-10), and the Beck Depression Inventory (BDI). Permission to use the Addiction Severity Index in the study was obtained as required. The Addiction Severity Index was translated into Turkish by a team of addiction professionals proficient in English. Once items with different translations were identified, the translator proceeded to back-translate. The scale was finalized by selecting items that accurately represented the original scale, were easy to comprehend, and culturally suitable. Clinical psychologists conducted interviews with patients upon admission for treatment, with each interview typically lasting around 45-50 minutes. Interviewers reviewed the ASI-Treatnet guide to understand the application and evaluation methods of the interview, as well as the scale, before conducting the interview.

Instruments

Demographic Information Form

The researcher utilized a demographic information form to gather personal, sociocultural, and demographic data relevant to the variables under investigation in this study. The form inquired about participants' ages, genders, marital status, levels of education and income, occupational statuses, general medical conditions, medical history, family dynamics, and legal backgrounds.

Addiction Severity Index (ASI)

Developed by McLellan and colleagues, this scale is a 200-item semi-structured interview (6). The interview begins with a general information section covering demographic details such as age, gender, address, and information about the referral source, followed by the assessment of six core domains: (a) medical status; (b) employment/support; (c) alcohol, substance, and medication use; (d) family and social functioning; (e) legal status; and (f) psychiatric disorders. With the inclusion of the general information section, a total of seven areas are evaluated. Both the patient and the interviewer utilize distinct rating scales to evaluate the extent of issues in each domain, while the interviewer also evaluates the trustworthiness of the data collected (whether the patient attempted to deceive with their responses or understood them accurately). The patient evaluates the severity of the issue and the significance of the requirement for counseling, outpatient, or inpatient treatment for each of the seven problematic areas using a scale of 1-5.

The interviewer assesses the patient's requirement for additional treatment in each category using a 9-point scale. This assessment takes into account the patient's symptom history, current condition, and the patient's self-evaluation. The interviewer rates the level of treatment needed in different aspects, ranging from 0 (no treatment required) to 9 (necessary for life-threatening situations). Another evaluation carried out by the interviewer focuses on the patient's reliability. This assessment offers insight into the "quality" of the interview, such as whether the patient tried to deceive the interviewer or fully understood the questions.

Michigan Alcoholism Screening Test (MAST)

The Michigan Alcoholism Screening Test (MAST) is a 25-item self-report assessment tool developed by Gibbs (12) to identify alcohol use problems. This scale is highly effective in distinguishing individuals with alcohol use disorders, as it assesses impairment in social functioning related to alcohol use and can indicate alcoholism based

on high scores. The cut-off score for determining alcohol use disorder is typically between 5 and 9. In the Turkish version of the scale, a cut-off score of 5 has a sensitivity of 79% and specificity of 99%, while a cut-off score of 9 has a sensitivity of 91% and specificity of 95% (13).

Drug Abuse Screening Test (DAST-10)

The Drug Abuse Screening Test (DAST-10) is commonly used as an assessment tool. The Drug Abuse Screening Test is modeled on the Michigan Alcoholism Screening Test and consists of 28 questions that help identify individuals with varying levels of substance use problems. DAST assesses substance use and its consequences within the last year (14). In the Turkish adaptation of DAST-10, scores fall between 0 and 10, and a score of 4 or greater may indicate a substance use issue.

Beck Depression Inventory (BDI)

The Beck Depression Inventory was created to assess the severity of depressive symptoms (15). Each of the 21 items in this scale is rated on a scale of 0 to 3 based on the intensity of depression, resulting in a total score that falls between 0 and 63. A score of 0-9 on the scale suggests the absence of depression. Mild depression is indicated by a score of 10-16, moderate depression by a score of 17-24, and severe depression by a score of 25 or higher.

Statistical Analysis

All statistical analyses were performed using SPSS v27.0 and included descriptive statistics for all categorical and continuous variables. We calculated the minimum sample size for the analysis of variance (ANOVA) test (significance level: 0.05, number of groups: 3, effect size: 0.4) as 64.

The data analysis displayed descriptive statistics, showing the range from minimum to maximum values and the median for variables that were not normally distributed. Normally distributed variables were characterized by their mean and standard deviation. Categorical variables were reported as frequencies and percentages. Patient rating scales were used for all seven areas, following standard procedures (6, 7). Inter-rater reliability, test-retest reliability, and internal consistency among the reliability indicators were examined. Concurrent reliability was examined in a design in which 30 subjects were randomly selected in one center (Antalya) for a second interview.

In the first and second interview, the same clinically experienced psychologist from the center applied the scale. The ratings on the seven problem areas were compared. The stability of the measures over time was evaluated by comparing rating scores between the first and second interviews with a time interval of seven days. Test-retest and inter-rater reliability were assessed using the Spearman-Brown correlation coefficient. Discriminant validity was assessed by comparing the scores from the ASI with those obtained from the MAST, DAST-10, and BDI. To assess the validity of the ASI severity ratings, the total patient population was divided into low, medium, and high severity groups based on their ratings in each of the ASI problem areas. Low-severity patients had scale points of 0 or 1, while medium- and high-severity groups had scale values of 2 or 3, and 4, respectively. These comparison items were taken from the items describing the trouble or bother that patients experienced in each ASI problem area. The three groups were then compared on each of the items using analysis of variance. Bonferroni post hoc comparisons were employed to analyze subgroups. The exploratory factor analysis literature provides a wide range of rough guidelines regarding an adequate sample size. Most of these guidelines consistently advocate for large samples (say, a sample size of at least 200) to obtain high-quality factor analysis solutions (16). Given the current sample size, exploratory factor analysis could not be employed. Internal consistency was calculated using Cronbach's alpha test. The significance level (p value) was set at 0.05.

RESULTS

The study included a total of 141 participants, with a mean age of 33.7 years (standard deviation [SD]=11.59). Of the participants, 127 (90%) were male and 14 (10%) were female. Further descriptive characteristics are presented in Table 1.

Reliability Studies

In the reliability studies, a test-retest reliability analysis was conducted with a 7-day interval on a randomly selected group of 30 subjects. Following the initial ASI interview, subjects were evaluated in a second interview by the same interviewer. The participants were asked to describe the last 30 days during the second interview. The Spearman's correlation coefficients for each subscale were as follows: 0.81 for medical status, 0.69 for employment/support status, 0.88 for alcohol/drug use status, 0.91 for legal status, 0.79 for family-social relations status, and 0.90 for psychiatric status (all $p<0.05$).

The interrater reliability was examined using a design in which two interviewers evaluated the same 31 participants through separate interviews during the same time period. The severity ratings for

Table 1: Descriptive characteristics of the sample (n=141)

Variable	n (%)/Mean±SD
Age (years)	33.70±11.59
Gender	
Male	127 (90)
Female	14 (10)
Marital status	
Single	76 (53.9)
Married	42 (29.7)
Divorced	23 (16.3)
Education	
Primary	26 (18.6)
Secondary	62 (43.9)
High school	31 (21.9)
University	22 (15.6)
Employment status	
Employed	96 (68)
Unemployed	45 (32)
Diagnosis	
Alcohol use disorder	28 (19.8)
Substance use disorder	113 (80.2)

n: Number; SD: Standard deviation.

the six problem areas were compared. The interrater reliability coefficients for each subscale were as follows: 0.91 for medical status, 0.72 for employment/support status, 0.85 for alcohol/drug use status, 0.95 for legal status, 0.73 for family-social relations status, and 0.89 for psychiatric status (all $p<0.05$). Interrater reliability coefficients are shown in Table 2.

Cronbach's alpha correlation coefficients were calculated for the internal reliability analysis after excluding the nominal values. Cronbach's alpha value was 0.82, indicating acceptable internal consistency. Cronbach's alpha values for subgroups were as follows: medical 0.77, employment 0.68, alcohol/drug use 0.85, legal 0.71, family/social 0.66, and psychiatric 0.81.

Validity Studies

The discriminant validity of psychiatric status and alcohol use problems was assessed by utilizing the Turkish version of the BDI and MAST. The correlation between the total BDI score and the severity rating of psychiatric status was 0.32 ($p=0.002$). A high correlation was found between the total MAST score and the severity rating of alcohol problems, with a coefficient of 0.71 ($p<0.001$). The drug problems score showed a moderate correlation with DAST-10 ($r=0.51$, $p<0.001$). The discriminant validity of the scale is shown in Table 3.

Table 2: Interrater reliability coefficients (correlation analysis results)

Scales	Interrater reliability coefficients
Medical	0.91
Employment	0.72
Alcohol/drug use	0.85
Legal	0.95
Family/social	0.73
Psychiatric	0.89

Table 3: Discriminant validity of the scale

Scales	BDI	MAST	DAST-10
Psychiatric severity rating	0.32**	-0.07	0.22*
Alcohol severity rating	0.35***	0.71***	-0.51*
Drug severity rating	0.11	-0.52*	0.51***

*p<0.05; **p<0.01; ***p<0.001. BDI: Beck Depression Inventory; MAST: Michigan Alcohol Screening Test; DAST: Drug Abuse Screening Test.

The total patient population was divided into low, medium, and high severity groups based on their ratings in each of the ASI problem areas. Concurrent validity analyses were conducted among the three groups. There were notable distinctions among the groups in terms of all problem areas and items, indicating that the ASI demonstrates concurrent validity. Concurrent validity of the scale is shown in Table 4.

DISCUSSION

The objective of this study was to validate the ASI in the Turkish language. This study found that the Turkish adaptation of the ASI demonstrates strong reliability and validity when evaluating individuals with ASUD. Both the test-retest and interrater reliabilities of the Turkish version of the ASI were found to be high. In a study involving drug-dependent patients, the Chinese version of the ASI showed test-retest correlation coefficients ranging from 0.68 to 0.84 and interrater correlations ranging from 0.74 to 0.98 (17). Another study, using the adaptive version of the ASI, found that interrater correlations ranged from 0.88 to 0.96 (7).

On the other hand, some previous studies have reported that the legal, drug, and family/social scales have low internal consistency (18, 19). The original American study with patients admitted to an outpatient clinic reported Cronbach's alpha values ranging from 0.58 to 0.74 (20). However, in this study, the internal consistency with Cronbach's alpha values was significantly high for the total score. These differences in the results may be attributed to methodological variations between previous studies and our study.

Table 4: Concurrent validity of the scale (analysis of variance results)

Severity rating scales	Low (0-1) n	Moderate (2-3) n	High (4) n	p	F	η^2
Medical status	91	23	27	0.01 (III>II, III>I)	4.73	Medium
Employment/support	65	45	31	0.01 (III>I, II>I)	4.78	Medium
Legal status	97	29	15	<0.001 (III>I, III>II, II>I)	9.70	Large
Alcohol/drug use	45	52	44	<0.001 (III>I, III>II, II>I)	9.92	Large
Family/social relations status	35	43	63	0.02 (III>I)	3.94	Small
Psychiatric status	29	59	56	<0.001 (III>I, III>II, II>I)	10.22	Large

η^2: Effect size (small: 0.01, medium: 0.06, large: 0.14). I: Low; II: Moderate; III: High.

The correlations between the composite score of the ASI and each of the severity scores of the subscales were statistically significant. The correlations ranged from 0.52 to 0.97. This result was similar to that of previous studies, which also reported similar findings (6, 21, 22). In their studies, correlation coefficients between the corresponding severity ratings and composite scores ranged from 0.22 to 0.93.

In this study, the discriminant validity of the ASI was determined for the psychiatric status and alcohol/drug use subscales. Studies focused on substance users demonstrated that the correlation of the substance score with MAST and DAST-10 was significant. Similarly, Dixon et al. (23) found a significant relationship between the psychiatric status subscale of the ASI and mood and anxiety disorders. The findings indicated that individuals with substance use disorder often have various psychiatric issues that can be accurately identified using the ASI. The results of the current study regarding the validity levels of the alcohol/drug use and psychiatric status subscales were consistent with those reported in earlier research by Dixon et al. (1996) and Zanis et al. (1994) (23, 24).

In this research, the concurrent validity analysis was conducted in a manner similar to the study by McLellan et al. (6). The results of the ANOVA revealed a significant correlation between the specific items identified and the corresponding problem area. It should be noted that the relationship of the patient's subjective assessments to the more objective items varies from one area to another.

This study has some limitations. First, the utilization of a wider range battery to evaluate patients' psychiatric comorbidities could lead to a more accurate discriminant analysis. Additionally, the inclusion of individuals who use both alcohol and other substances in the sample group may have resulted in heterogeneous data. Thus, lack of validity analyses in terms of diagnostic subgroups might have influenced the results. Finally, the scale's lack of sub-items related to behavioral addictions may have resulted in certain deficiencies.

CONCLUSION

To conclude, the findings of this study suggest that the ASI is a reliable and valid instrument for conducting a thorough evaluation of the biological, social, and psychiatric well-being of patients. It is also an appropriate tool for offering information and counseling to individuals struggling with substance use disorders. Additionally, the ASI can be used for different types of mentally ill patients who have co-occurring substance abuse disorders. In light of recent research, it is clear that further studies on expanded and online-adapted versions of the ASI will be essential moving forward.

Ethical Approval: The University of Health Sciences, Erenkoy Training and Research Hospital for Psychiatry and Neurological Diseases Ethics Committee granted approval for this study (date: 20.06.2022, number: 34).

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	Data acquisition	S.S., E.Y., S.K.
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Category 2	Drafting manuscript	R.B., M.E.Y.
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LETTER TO THE EDITOR

Successful initiation of catatonia treatment with oral diazepam in bipolar disorder: A case report

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Dear Editor,

Catatonia is a severe neuropsychiatric syndrome with life-threatening consequences (1). While lorazepam remains the first-line treatment (2), its limited availability in many countries, including ours, necessitates alternative approaches. Other benzodiazepines (such as diazepam, oxazepam, clonazepam, and midazolam) have been explored for catatonia treatment (3–6). Although intravenous diazepam has been studied in this context (6), to our knowledge, no prior reports have documented the successful initiation of catatonia treatment with oral diazepam. Here, we present two female patients with bipolar disorder who developed catatonia and were successfully treated with oral diazepam as the initial intervention. In both cases, catatonia was diagnosed according to DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition) criteria and monitored using the Bush-Francis Catatonia Rating Scale (BFCRS). Symptom remission occurred within 48 to 72 hours of initiating oral diazepam.

In the first case, a 61-year-old female with bipolar disorder presented with disorientation, disorganized speech and behavior, persecutory delusions, verbigeration, agitation, and reduced oral intake. Her symptoms had progressively worsened over 14 days prior to admission. One year earlier, she had experienced a catatonic episode that resolved with lorazepam initiation. Lorazepam had since been gradually tapered during outpatient follow-up. Upon admission, laboratory tests (blood/urine and cultures) and imaging studies (computed tomography (CT) and magnetic resonance imaging (MRI) to rule out delirium revealed no infectious or neurological abnormalities. The patient's initial BFCRS score was 10. Due to the unavailability of lorazepam in our country, oral diazepam (20 mg/day) was added to her treatment regimen, alongside her maintenance therapy with lamotrigine (300 mg/day). Her catatonic symptoms improved significantly within 24 hours, with the BFCRS score decreasing to 2 and reaching complete resolution (score of 0) within 48 hours. After remission for catatonic symptoms, clozapine was initiated to address mood symptoms. In the following days, the patient experienced mild sedation, which necessitated the gradual tapering of diazepam. She was discharged on day 19 of inpatient follow-up, having achieved remission of both catatonic and mood symptoms. At discharge, her medications included lamotrigine (300 mg/day) and clozapine (25 mg/day). During outpatient follow-up, the patient developed a depressive episode with psychotic features, including nihilistic delusions and catatonic symptoms such as stereotypy and verbigeration. Given her prior positive response to diazepam, 20 mg/day was initiated along with venlafaxine, in addition to her existing maintenance therapy. Her catatonic symptoms resolved first, followed by remission of depressive symptoms in the

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following days. Due to the recurrence of catatonic symptoms, diazepam (5 mg/day) was incorporated into her maintenance regimen. After three months, the patient developed pneumonia, requiring admission to the intensive care unit (ICU). During her ICU stay, all psychiatric medications were tapered and discontinued. Two weeks later, she presented to the emergency department with decreased motor activity and verbalization, reduced oral intake, stereotypic movement, and fixed gaze. Her initial BFCRS score was 17. Given the unavailability of lorazepam and her previous positive response to oral diazepam, diazepam (20 mg/day) was initiated after she was transferred to our inpatient clinic. The patient demonstrated a similar response to treatment, with gradual symptom resolution within 48 hours. Her BFCRS score decreased to 10 within the first 24 hours and returned to 0 by 48 hours. Alongside diazepam, treatment with clozapine, lamotrigine, and venlafaxine was reinstated as her catatonic symptoms resolved, and she was discharged on the fourth day of hospitalization.

The second case involved a 62-year-old female with a history of bipolar disorder who was admitted to the inpatient unit with a 10-day history of progressively worsening mutism, reduced oral intake, and psychomotor retardation. The patient's first psychiatric admission occurred at the age of 36 due to manic symptoms. Over the subsequent years, she required five inpatient admissions for manic episodes, one of which included psychotic features. Her most recent hospitalization had taken place eight months prior to the current admission, following another manic episode. She had been in remission on a regimen of clozapine 100 mg/day and lithium 600 mg/day. However, one month before this admission, she experienced lithium intoxication requiring emergency dialysis. Following this event, lithium was discontinued, and the patient was maintained on clozapine monotherapy. At admission, her BFCRS score was 16, indicating severe catatonia. In the absence of lorazepam, oral diazepam 5 mg was administered. Within one hour, the patient showed marked clinical improvement, with her BFCRS score reduced to 3. The diazepam dose was subsequently titrated to 20 mg/day, resulting in complete resolution of catatonic symptoms (BFCRS=0) within 72 hours. Following the resolution of catatonia, the patient exhibited depressive symptoms, for which lithium was cautiously reinitiated alongside ongoing clozapine and diazepam treatment. On day 18 of hospitalization, the patient developed acute respiratory failure secondary to aspiration pneumonia, necessitating ICU transfer. During her ICU stay, diazepam and clozapine were gradually tapered. After three days in the ICU, the patient was retransferred to the psychiatric unit, where clozapine and lithium were reintroduced. She remained clinically stable and was discharged on day 28 without residual catatonic or mood symptoms.

Although previous studies have documented the use of intravenous (IV) diazepam or oral diazepam for maintenance therapy (6–8), these cases suggest that oral diazepam can also be effective as a first-line acute treatment for catatonia, especially when lorazepam is unavailable. In earlier studies, clonazepam, oxazepam, and midazolam have also been considered in catatonia management (9). However, diazepam's rapid onset, long half-life, and active metabolites may provide both quick and sustained therapeutic effects, reducing the need for frequent dosing (10). Additionally, oral diazepam may be particularly beneficial for patients who cannot tolerate IV therapy or in settings where IV access is limited. Diazepam's longer half-life and faster peak plasma level compared to lorazepam may contribute to prolonged receptor activation, potentially sustaining therapeutic benefits while reducing withdrawal effects. Furthermore, the recurrence and resolution pattern observed in the first case underscores the importance of maintenance benzodiazepine therapy in recurrent catatonia.

To the best of our knowledge, this is the first report to document oral diazepam as an initial treatment for catatonia. While the small number of cases limits generalizability, the consistency, recurrence, and speed of response are clinically notable. These findings encourage clinicians to consider oral diazepam as an alternative treatment when lorazepam or IV administration is unavailable for managing catatonia. This case series was approved by the Ege University Ethics Committee (Approval No: 2024-4284). Written informed consent for publication was obtained from both patients.

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LETTER TO THE EDITOR

Cannabinoid hyperemesis syndrome: Diagnosis and effective treatment in a psychiatric ward

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Dear Editor,

Cannabinoid Hyperemesis Syndrome (CHS) is an underrecognized clinical condition that is becoming increasingly common with the rise in cannabis use. Characterized by cyclical episodes of severe nausea, vomiting, and abdominal discomfort that temporarily improve with hot showers or baths, CHS presents a diagnostic challenge in both emergency and psychiatric settings. Although first described in 2004, it remains unfamiliar to many clinicians, often leading to repeated emergency visits, unnecessary investigations, and inappropriate treatments (1).

We present the case of a 34-year-old male who had been using cannabis heavily since the age of 18, consuming five to six marijuana cigarettes daily. Over the course of one year, he experienced multiple hospital visits for persistent symptoms of nausea and vomiting, which were temporarily relieved by compulsive hot showers—up to 20 times per day. He had previously been admitted to psychiatric wards on two occasions due to depressive symptoms and suicidal ideation, but no definitive diagnosis was made. During these admissions, he was treated with antiemetics and benzodiazepines, with only minimal improvement.

Upon admission to our psychiatric unit, the patient exhibited a severely impaired quality of life. He had lost 18 kilograms over the past year and was unable to maintain employment due to the frequency of his symptoms. His mental status examination revealed a depressive affect, suicidal ideation, feelings of guilt and worthlessness, and agitation. He had a history of eight suicide attempts in the previous year, triggered by his unrelenting gastrointestinal symptoms and the resulting social and occupational dysfunction.

Our clinical team conducted a comprehensive evaluation, including laboratory and imaging studies, all of which yielded normal results. A CHS diagnosis was made based on the Rome IV criteria: (1) stereotypical vomiting episodes, (2) chronic cannabis use, (3) symptom relief after cessation, (4) compulsive hot bathing, and (5) exclusion of organic causes (2). Given the patient's chronic cannabis use, compulsive bathing behavior, and persistent vomiting, the diagnosis of CHS was consistent with previously reported clinical patterns (3). His depressive symptoms emerged after the onset of vomiting and significant functional impairment, suggesting a secondary, substance-induced depression, rather than a primary mood disorder. Structured interviews excluded primary depressive, psychotic, and anxiety disorders. The differential diagnosis included obsessive-compulsive disorder due to his compulsive showering, but there were no intrusive thoughts, compulsions, or impaired insight. Eating disorders were also considered, but there was no fear of weight gain, distorted body image, or restrictive eating behavior—weight loss was due to

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emesis and food avoidance caused by nausea. Cyclic vomiting syndrome and psychogenic vomiting were ruled out based on the patient's cannabis use history, bathing behavior, and the presence of psychiatric sequelae. A detailed history was obtained, and toxicological screening ruled out opioids and other psychoactive substances. Laboratory and imaging tests were normal. The Hamilton Depression Rating Scale was administered, yielding a score of 21.

Recent literature has reported CHS cases with suicidal behavior, illustrating the syndrome's emotional burden and the need for psychiatric vigilance (4, 5). Though CHS pathophysiology remains under investigation, proposed mechanisms include CB1 receptor downregulation, delayed gastric emptying, hypothalamic-pituitary-adrenal axis dysregulation, and involvement of the transient receptor potential vanilloid 1 (TRPV1) pathway (6). These neurobiological insights suggest that CHS is both a gastrointestinal and neuropsychiatric disorder.

Treatment was initiated with nutritional support, amitriptyline (25 mg/day, titrated up to 75 mg/day), amisulpride (400 mg/day), and topical capsaicin cream applied every four hours. Over the course of three weeks, the patient showed remarkable improvement. His vomiting ceased, hot shower frequency decreased from 15 times daily to once daily, and his appetite and mood significantly improved. He was discharged with ongoing pharmacological therapy and remained abstinent from cannabis. At follow-up, the patient reported no recurrence of symptoms, was eating regularly, and no longer exhibited suicidal ideation. He was evaluated weekly for three months after discharge, during which time he abstained from cannabinoid use and reported no complaints.

This case highlights the importance of considering CHS in patients with chronic cannabis use and unexplained, recurrent vomiting—particularly when compulsive hot bathing behavior is reported. CHS often mimics other gastrointestinal or psychiatric conditions, leading to misdiagnosis, as noted in recent prevalence studies (7). The patient received psychoeducation regarding the nature of his condition, the link between cannabis use and his symptoms, and the importance of cessation. However, no individual or supportive psychotherapy was initiated during the inpatient stay. Psychoeducation on the relationship between cannabis use and hyperemesis is essential to prevent relapse. While patients may perceive cannabis as relieving nausea, continued use may paradoxically exacerbate the condition.

Although treatment protocols remain under development, the literature increasingly supports the efficacy of topical capsaicin, tricyclic antidepressants such as amitriptyline, and antipsychotics. These findings align with recent reviews supporting the use of capsaicin in CHS management (8, 9). Capsaicin is believed to act through activation of the TRPV1 receptor, which is involved in thermoregulation and nociception (8, 9). Amitriptyline contributed to both symptomatic and psychiatric recovery in our case, consistent with literature supporting the role of tricyclic antidepressants in the psychiatric management of CHS (9, 10).

In conclusion, clinicians—especially psychiatrists—should remain vigilant for CHS in patients presenting with persistent vomiting, depressive symptoms, and a history of chronic cannabis use. Early diagnosis, psychoeducation, and structured cannabis cessation strategies are essential to reduce patient distress, prevent unnecessary medical interventions, and avoid potentially life-threatening psychiatric sequelae.

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LETTER TO THE EDITOR

Addiction and misogyny: A case report of a woman coerced into addiction by her husband

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Dear Editor,

Gender-based violence, particularly intimate partner violence (IPV), has a profound and often underrecognized influence on the development and perpetuation of substance use disorders (SUDs) among women. Coercion into substance use by controlling male partners is a specific and severe form of abuse that can entrap women in cycles of addiction and dependency (1–3). This letter presents the case of Mrs. X, a 42-year-old woman from a rural area, whose heroin use was covertly initiated and sustained by her husband over a 20-year period. Her story illustrates how IPV, misogyny, and structural barriers intersect to prevent women from seeking help and recovering safely. In this case, misogyny refers to a system of control in which the husband asserted power by forcing his wife into substance use and maintaining her dependency. It is not merely personal hostility, but part of a broader pattern of silencing, devaluing, and limiting women's autonomy through coercion and neglect.

Mrs. X, who had no formal education and was the mother of four children, began using opium at age 19. Her husband secretly added it to her tea to conceal his own heroin use, later justifying it by saying, "I got you used to it because if you found out I was using heroin, you would leave me." At the time, Mrs. X was unaware that her tea contained opium; her first exposure to the substance was entirely involuntary. Over time, her growing physiological dependence led her to seek the substance herself, though always within a context of fear and coercive control. This statement reflects a deliberate strategy of control and dependency, echoing descriptions of substance use coercion as a form of IPV and sexual exploitation (2, 3). Over two decades, she lived with escalating substance use, physical abuse, financial deprivation, and deep social isolation. It was only after her husband's incarceration that she sought help for the first time—an opportunity made possible by his physical absence and the temporary suspension of coercive control.

Upon presenting to our addiction center, Mrs. X declined inpatient treatment due to the lack of women-only facilities and concern over who would care for her children. Her reluctance is consistent with findings that many women avoid addiction services out of fear of losing custody or facing stigma related to their roles as mothers (4, 5). Outpatient buprenorphine/naloxone therapy was initiated, along with psychosocial support, financial aid, and family engagement. Mrs. X achieved remission within three months and has been followed in outpatient care for 11 months, with no additional pharmacological interventions. Follow-up remains ongoing. To reduce the risk of re-exposure to violence, our team developed a safety plan in collaboration with social services, including safe housing options and child welfare support in the event of her husband's release.

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There are several clinical and social implications worth emphasizing. First, coercion into substance use is a key factor in both treatment and prevention, and it should be more widely recognized in healthcare settings (as illustrated in this case). Second, the lack of gender-sensitive treatment options, such as women-only spaces and integrated childcare, disproportionately affects women's ability to access and remain in treatment (6, 7). Third, patriarchal cultural norms often frame women with addiction as morally flawed, reinforcing stigma and further discouraging help-seeking behaviors (8, 9). Clinicians must remain sensitive to these dynamics, particularly in rural or conservative settings where such stigma may be amplified.

Mrs. X's case also highlights the importance of a trauma-informed approach in addiction treatment. Research shows that trauma-informed, women-only programs significantly improve outcomes for women with histories of IPV and coercion (1, 7). Moreover, integrating legal advocacy and social services into treatment planning is vital for long-term recovery, especially when the risk of re-exposure to a violent partner remains. Screening tools that include questions on substance use coercion and IPV should be standard in addiction services. Clinicians must be trained to detect subtle forms of control and trauma that may not be openly disclosed.

At a policy level, investing in women-specific addiction services is not only a matter of public health but of social justice. Expanding community-based care that is trauma-informed and integrated with social and legal supports can empower women to reclaim their lives. Efforts must also be made to challenge and change cultural narratives that blame women for their substance use while ignoring the structures and abuses that underpin it (6, 7, 10).

In conclusion, the case of Mrs. X shows that addiction among women can result from coercion and control within abusive relationships, and should be routinely screened for during referrals. Health systems should develop gender-neutral models to adequately serve women in these contexts. Incorporating IPV screening, creating safe treatment spaces, and recognizing coercion as a form of abuse are essential steps toward recovery and justice.

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LETTER TO THE EDITOR

Diagnosing somatic cough syndrome in a 13-year-old boy

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Dear Editor,

Cough is among the most common symptoms prompting patients to seek medical attention. It may be triggered by a range of factors, including infections, irritants, gastroesophageal reflux disease (GERD), and the use of angiotensin-converting enzyme (ACE) inhibitors (1). The broad spectrum of potential etiologies presents a diagnostic challenge, and despite thorough evaluation, a definitive cause cannot be identified in a substantial proportion of chronic cough cases (2). Among the differential diagnoses, psychogenic factors must also be considered, especially in patients with a persistent dry cough unresponsive to conventional treatments. According to the literature, 3.02% of chronic coughs in the general population are of psychiatric origin (3), while this rate is reported to be 5.5% in the pediatric population (4). This article presents a case of refractory cough that developed after neurosurgical intervention for a brain abscess and was ultimately diagnosed as somatic cough syndrome. The case highlights the diagnostic challenges involved and underscores the importance of considering psychological etiologies.

Our case involves a 13-year-old male, an eighth-grade student, who was referred to our clinic due to a persistent, nonproductive cough that had been ongoing since November 2024. His medical history included hospitalization in August 2024 for a brain abscess and meningitis following an accident, which required four neurosurgical procedures, including the placement of a ventriculoperitoneal (VP) shunt.

Following these interventions, he developed a chronic cough that led to frequent primary care visits. Treatments including antibiotics and inhalers were administered under the assumption of an infectious origin; however, no clinical improvement was observed. The patient was subsequently evaluated by specialists in otolaryngology, pediatric infectious diseases, pulmonology, allergy, and neurology, none of whom identified an organic cause for the cough.

With suspicions of a psychogenic etiology, he was referred to our department. The cough, described as dry and persistent throughout the day, began shortly after his neurosurgical procedures. He reported a throat discomfort preceding a compelling urge to cough, followed by repetitive bouts lasting about five seconds. The coughing episodes—likened to a "barking" sound—occurred every few minutes, and the patient reported being unable to suppress them. Notably, there were no coughing episodes during sleep, and his sleep quality remained unaffected.

The cough significantly impaired daily functioning, especially during classroom activities and social interactions. Physical activity and eating did not appear to influence the frequency, but emotional stressors—such as arguments with his sibling—were reported to exacerbate the symptoms. No diurnal variation or other fluctuation in severity was noted.

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Information obtained from the patient and his family indicated that, prior to the accident, he was a cheerful and active child who had good relationships with both peers and family members, though he frequently argued with his younger sibling. His father was described as authoritarian and placed a high value on academic achievement. While the patient enjoyed spending time with friends at school and did not experience bullying, he often expressed boredom with academic subjects.

Following the accident and subsequent surgical interventions, it was reported that the patient initially spent most of his time resting at home. After returning to school, he did not experience interpersonal difficulties with peers; however, he reported discomfort and embarrassment due to his persistent cough, which led to a reluctance to attend school. Although his family continued to send him, they had become less focused on his academic performance than before. At home, he received increased attention, and as his coughing episodes intensified during conflicts with his sibling, the family was perceived to take his side in these disputes.

Developmental milestones were reportedly achieved on time. He was under ongoing follow-up for a ventricular septal defect (VSD) and the VP shunt. Academically and socially, he was functioning well. Psychiatric assessment revealed a euthymic mood, age-appropriate cognitive function, and normal psychomotor activity. Frequent coughing was observed during the interview. Although no prominent symptoms were observed in the Revised Children's Anxiety and Depression Scale (and Subscales) (RCADS) completed by the patient, generalized anxiety and panic scores associated with the trauma indicated subclinical levels of anxiety. No additional psychiatric condition was detected during the clinical interview with the patient or in the information provided by the family.

The Wechsler Intelligence Scale for Children - Revised (WISC-R) revealed a verbal score of 90, a performance score of 94, and a total score of 91. During the test, it was observed that the child's coughing persisted and intensified during more challenging questions and tasks. The family demonstrated a high level of concern and attentiveness during consultations.

Further evaluations by pediatric neurology, pulmonology, and otolaryngology again failed to identify an underlying medical cause. Considering the patient's history of trauma, potential secondary gains, and the exclusion of other medical and psychiatric conditions, a diagnosis of somatic cough syndrome was made. Psychoeducation was provided to the patient and his family to increase awareness, and family therapy was collaboratively planned to help regulate family dynamics and facilitate the extinction of maladaptive behaviors.

Written informed consent was obtained from the patient and his parents for publication of this case report.

Somatic cough syndrome—formerly referred to as psychogenic, habit, or tic cough—is characterized by the absence of an identifiable medical cause and resistance to standard treatments. Literature suggests that a harsh, barking-type cough with no nocturnal symptoms strongly supports a psychogenic origin (5). However, similar cough patterns may also occur in conditions such as GERD or bronchiolitis (6). Therefore, the clinical presentation must be interpreted within a broader diagnostic context.

In this case, the dry, barking nature of the cough and its absence during sleep prompted a psychiatric referral. Somatic cough syndrome is a diagnosis of exclusion, requiring a thorough rule-out of organic causes. However, the diagnostic process is often prolonged, involving numerous consultations, investigations, and ineffective treatments—as seen in this case, including the use of antibiotics.

The patient's history of neurosurgery for a brain abscess complicated the clinical picture. Sequelae from prior illnesses or surgical interventions are typically prioritized in the differential diagnosis, which can delay consideration of a psychogenic cause. Early recognition of somatic cough syndrome is crucial to prevent unnecessary interventions and reduce healthcare costs.

Recent literature has favored the term "somatic cough syndrome" over "psychogenic cough," differentiating it from tic cough. This shift aligns with:

1. The exclusion of the term "psychogenic" in the DSM-5;
2. The inclusion of somatic symptom disorder as the most appropriate classification;
3. Clinical evidence that these coughs lack features characteristic of tic disorders (6).

In this case, the cough emerged after a traumatic stressor, persisted for five months, lacked the waxing-and-waning pattern typical of tics, was not suppressible, and conferred secondary gains related to family dynamics. These features support a diagnosis more consistent with a somatic symptom and related disorders rather than a tic disorder. Recognizing this distinction is essential when delivering psychoeducation and formulating treatment plans.

In other case reports presented in the literature (7, 8), coughs of psychiatric origin are frequently overlooked, and numerous medications and diagnostic tests are often administered before a correct diagnosis is made. In one case similar to ours, the patient did not receive an accurate diagnosis for over a year, consulted multiple specialists, used various medications including antihistamines and antibiotics, and underwent several diagnostic procedures (7). We believe that increasing physicians' awareness of somatic cough syndrome would facilitate earlier diagnosis and contribute to the development of standardized diagnostic and treatment algorithms.

Awareness of somatic cough syndrome is vital for early recognition and to prevent unnecessary and prolonged treatment efforts. Differentiating somatic cough syndrome from tic cough is essential for appropriate management and follow-up. Continued research is needed to improve diagnostic clarity and treatment outcomes.

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LETTER TO THE EDITOR

Ketamine use disorder: A case report

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Dear Editor,

Ketamine is a dissociative anesthetic that continues to be abused in many countries in Europe and the USA (1). A phencyclidine derivative, ketamine is used in both veterinary and human medicine. Its advantage in anesthesia lies in its ability to produce deep analgesia, amnesia, and sedation while preserving cardiopulmonary function and airway reflexes (2). Ketamine abuse is frequently associated with its use as a club drug (3). It is likely that many chronic users self-medicate with ketamine due to its antidepressant effects (4). The psychotropic effects of ketamine include dissociation (such as depersonalization or derealization) and psychotic experiences (such as delusions, auditory or visual hallucinations). Common experiences also include body distortion, loss of sense of time, feelings of cosmic oneness, and out-of-body experiences. These effects vary depending on mood, environment, and dosage, typically lasting up to 30 minutes (5, 6). Ketamine can become a drug of choice for abuse and can lead to dependence. It acts as an antagonist at the N-methyl-D-aspartate (NMDA) receptor, inhibits muscarinic acetylcholine receptors, and potentiates GABAergic (gamma-aminobutyric acid-mediated) inhibition. It also affects the dopaminergic system, increasing extracellular dopamine levels in the striatum and prefrontal cortex, and has affinity for μ-opioid and sigma receptors. These interactions form the neurobiological basis for the rewarding and reinforcing effects of ketamine (7–9). Evidence regarding ketamine withdrawal is inconsistent; however, cravings are commonly reported among frequent users. Although there is no defined withdrawal syndrome specific to ketamine, symptoms such as anxiety, tremors, sweating, and palpitations have been observed in some individuals (3, 7, 10). In Türkiye, there is insufficient data on the prevalence of ketamine abuse or ketamine use disorder.

The case presented in this study is that of a 52-year-old male patient with ketamine use disorder (written informed consent was obtained from the participant). The patient is divorced and has one child. He completed primary school and reported being the owner of a company that supplies drugs to the veterinary field. The patient has no known chronic medical illnesses, no history of psychiatric treatment, and no forensic history. He does not take any medication on a regular basis. He reported smoking three packs of cigarettes per day and consuming alcohol socially, typically three servings of beer once a week, with the most recent use two days prior to admission. Based on this information, the patient does not meet the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) diagnostic criteria for alcohol use disorder, as he does not experience problems related to intoxication or withdrawal, nor is there any alcohol-related impairment in functioning. He also reported short-term, irregular cannabis use in his thirties.

The patient stated that he had been using ketamine for the past four years. Initially, he used

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it once every 3–4 days for recreational purposes, but both the frequency and dosage increased significantly in the past year. He reported using an average of 3–4 grams of ketamine daily. He stated that he had easy access to the drug through the veterinary company he owns; he boiled ketamine in ampoule form into a solid, then converted it into powder and administered it intranasally. The patient's family noticed his recent substance use, which the patient himself interpreted as a loss of control. Following this realization, he sought help at the Research, Treatment, and Training Center for Alcohol and Substance Dependence at our hospital, and the inpatient treatment process was initiated.

The patient stated that he had not used ketamine for two days at the time of admission and described restlessness, anxiety, and intense craving for ketamine. Mild agitation, tremor, and diaphoresis were observed on objective examination. Vital signs and electrocardiogram (ECG) results were within normal limits, and no significant abnormalities were found in blood tests. Urine toxicology revealed no notable findings except for ethyl glucuronide positivity. Psychiatric evaluation showed that the patient was conscious, oriented, and cooperative. His mood was mildly depressed, and his affect was sad. Thought processes were coherent, speech content was appropriate for his sociocultural background, and no psychotic symptoms were observed. The patient stated that while under the influence of ketamine, he felt an increase in cognitive capacity, believed his mental power had reached extraordinary levels, thought he could read others' minds, and felt happy and energetic. These entactogen experiences were considered related to the psychotomimetic effects of ketamine.

Due to the lack of a specific pharmacologic treatment protocol for ketamine use disorder, a supportive approach was adopted. A review of the literature shows that previous case reports have used agents such as diazepam or carbamazepine to treat withdrawal symptoms like restlessness, anxiety, and insomnia (11, 12). In our case, extended-release quetiapine was initiated at a dose of 150 mg/day to manage anxiety and stabilize mood. On the second day, when the patient reported difficulty falling asleep, 50 mg/day of normal-release quetiapine was added to the treatment. By the third day, withdrawal symptoms had subsided, and the patient reported no active complaints. He stated that his general condition was good, expressed a desire to continue treatment as an outpatient, and was subsequently discharged.

Ketamine affects dopaminergic, GABAergic, and opioidergic systems, particularly through NMDA receptor antagonism, and has addictive potential due to these properties (7, 8). In the case presented, recreational ketamine use escalated to high daily doses over time, resulting in a clinical picture consistent with substance use disorder. Although there is no defined withdrawal syndrome specific to ketamine, symptoms such as restlessness, craving, tremor, and diaphoresis support this possibility.

The patient's experiences of cognitive enhancement, boundary dissolution, and "mind reading" while under the influence of ketamine suggest that its psychotomimetic effects may be reinforcing on an individual level. As there is no specific pharmacological protocol for treating ketamine abuse, a supportive, symptom-focused approach was adopted, and significant clinical improvement was achieved with quetiapine.

This case demonstrates that ketamine abuse can evolve into a use disorder, may be accompanied by withdrawal symptoms, and can be associated with psychotic-like experiences. It should be noted that the risk is particularly elevated in occupational groups with easy access to the substance. More clinical data are needed in this area.

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