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RESEARCH ARTICLE

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

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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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