

Improving Alexithymia in Adults with ADHD: Comparing Metacognitive and Transdiagnostic Therapies

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ABSTRACT

Purpose: This study aims to assess the effectiveness of Metacognitive and Transdiagnostic Therapies in alexithymia in Adults with ADHD.

Methods and Materials: This study employed a semi-experimental design with a pre-test and post-test control group structure aimed at assessing the effects of two interventions on adults with ADHD symptoms. The population included all adults with diagnosed ADHD symptoms in 2024, referred from psychology and psychiatric centers in Damavand city. Purposive sampling was used to select participants. A sample of 48 patients was selected and randomly divided into intervention (MCT, $n = 17$), (MDT, $n = 16$), and control ($n = 15$) groups. The experimental groups underwent eight (MCT) sessions and ten (MDT) sessions (90-minute sessions per week), and the control group did not receive any intervention. The research instruments included the S-ADHD (Connors et al., 2012) and Toronto Alexithymia Scale (Bagby et al., 1997). Univariate and multivariate analyses of covariance (ANCOVA) and Bonferroni post hoc tests were conducted using SPSS-27.

Findings: findings showed a statistically significant difference between the control group and both treatment groups—metacognitive and transdiagnostic therapy—in reducing levels of alexithymia ($P < 0.001$). This indicates that both therapies were effective in improving alexithymia compared to no treatment. Furthermore, a significant difference was observed between the two active treatment groups themselves ($P < 0.05$). Specifically, the transdiagnostic therapy group exhibited a greater reduction in alexithymia scores, with a mean difference of -4.85 , indicating a more substantial effect on emotional awareness among adults with ADHD symptoms.

Conclusion: Overall, the findings suggest that both metacognitive and transdiagnostic therapies significantly reduce levels of alexithymia in adults with ADHD symptoms. However, transdiagnostic therapy demonstrated greater effectiveness compared to metacognitive therapy. The improvements observed with both approaches help participants develop a more profound and accurate understanding of their mental states, which, in turn, enhances their ability to regulate social interactions and effectively manage their emotions.

Keywords: Alexithymia, Adults, ADHD, Metacognitive Therapy, Transdiagnostic Therapy

1. Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder traditionally associated with childhood; however, it increasingly garners recognition for its enduring impact into adulthood. Current epidemiological data confirm that ADHD persists in a substantial proportion of individuals beyond adolescence, with global prevalence estimates in adults ranging between 2.5% and 4.4% (Song et al., 2021). Characterized by inattention, hyperactivity, and impulsivity, adult ADHD is further complicated by emotional instability, poor executive functioning, and social impairments (Sibley et al., 2022). The clinical manifestation of ADHD in adulthood often includes significant mood lability, irritability, and deficits in emotional regulation, challenging the conventional understanding of the disorder and necessitating a more integrative treatment approach (Brancati et al., 2023; Shaw et al., 2014).

Neuroscientific research has established that executive dysfunction is a critical contributor to ADHD symptoms. Individuals with ADHD frequently display impairments in working memory, inhibitory control, and cognitive flexibility, all of which are governed by the prefrontal cortex and related neural circuits (Tatar & Cansiz, 2022). These executive deficits are not only foundational to the core symptoms of ADHD but also interfere with social cognition, including theory of mind capacities essential for empathic interaction and social comprehension (Singh et al., 2021). These limitations can negatively impact interpersonal relationships and occupational functioning (McDougal et al., 2023). In addition, emotional dysregulation has been recognized as a defining feature of ADHD, often manifesting as difficulties in identifying, interpreting, and expressing emotions—a cluster of symptoms commonly referred to as alexithymia (Shaw et al., 2014).

Alexithymia, conceptualized as a deficit in emotional awareness and articulation, is prevalent among individuals with ADHD, affecting an estimated 34% to 70% of this population (Shaw et al., 2014). It is associated with diminished emotional intelligence, impaired interpersonal relationships, and a propensity for maladaptive coping mechanisms such as avoidance and suppression (Bagby & Parker, 1994; Besharat, 2008). The Toronto Alexithymia Scale (TAS-20), one of the most widely used instruments to measure this construct, has demonstrated robust psychometric validity across cultures and clinical groups, including its Persian version validated for use in Iranian

populations (Bagby & Parker, 1994; Besharat, 2008). The presence of alexithymia exacerbates ADHD-related dysfunction by disrupting emotional self-regulation and increasing vulnerability to comorbid psychiatric conditions such as depression and anxiety (Faraone et al., 2024; Pagán et al., 2023).

Despite advances in pharmacological treatments, many adults with ADHD continue to struggle with symptoms related to emotional processing and executive dysfunction. Consequently, psychological interventions that target these domains have gained increasing attention in recent years (Pirozzi, 2021). Among these, metacognitive therapy (MCT) and transdiagnostic therapy (TDT) offer promising, evidence-based approaches. Metacognitive therapy is based on the premise that maladaptive metacognitive beliefs about thoughts and emotions contribute to sustained psychological distress (Wells & Matthews, 2016). The MCT framework emphasizes the modification of these beliefs and the disengagement from worry and rumination, using strategies such as detached mindfulness and attention training to foster cognitive flexibility and emotional self-regulation (Mohammadi et al., 2022; Wells & Matthews, 2016). Studies have demonstrated that MCT is effective in reducing symptoms of emotional distress and alexithymia across clinical populations, including individuals with functional dyspepsia and children with ADHD (Hashemi et al., 2023; Mohammadi et al., 2022).

The metacognitive model also underscores the concept of the cognitive-attentional syndrome (CAS), a pattern of perseverative thinking—such as worry and rumination—along with attentional biases and maladaptive coping strategies. These components collectively contribute to emotional dysregulation and impaired functioning (Wells & Matthews, 2016). By targeting the CAS, MCT promotes a higher-order awareness of thought processes, enabling individuals to shift away from unhelpful mental habits and engage in more adaptive emotional regulation (Kukla & Lysaker, 2020; Lenartowicz et al., 2024). The relevance of this approach to ADHD is underscored by findings that metacognitive deficits in attention control and cognitive monitoring are prominent in adults with the disorder, supporting the rationale for MCT as an intervention in this population (Lenartowicz et al., 2024).

In parallel, transdiagnostic therapy has emerged as an innovative, flexible model that addresses shared emotional regulation mechanisms across psychological disorders. Rooted in cognitive-behavioral therapy, transdiagnostic therapy integrates elements of emotional awareness,

cognitive restructuring, and experiential exposure to create a comprehensive framework applicable across diagnoses (Barlow, 2011; Craske & Barlow, 2022). The Unified Protocol for Transdiagnostic Treatment of Emotional Disorders, developed by Barlow and colleagues, aims to cultivate emotional acceptance and reduce avoidance behaviors, both of which are particularly relevant to the emotional dysregulation seen in ADHD (Barlow et al., 2021; Craske & Barlow, 2022). Several studies have confirmed the efficacy of TDT in treating anxiety, depression, and emotion-related disorders, demonstrating its capacity to improve both positive and negative affect regulation and cognitive flexibility (Cuijpers et al., 2023; Díaz-García et al., 2021).

The transdiagnostic model posits that core mechanisms such as emotional avoidance, negative appraisal of emotions, and poor emotional awareness underpin a broad spectrum of disorders (Hasking & Claes, 2020). Therefore, rather than focusing on disorder-specific symptoms, TDT targets these underlying processes, offering a more unified and generalizable treatment approach (Cuijpers et al., 2023; Vijayapriya & Tamarana, 2023). This approach has been particularly beneficial in reducing alexithymic traits and enhancing emotion regulation capacities in clinical and non-clinical populations alike (Tonarely-Busto et al., 2023; Yan et al., 2022).

In the context of ADHD, where emotional instability often intersects with executive dysfunction, the application of both metacognitive and transdiagnostic therapies represents a significant advancement in holistic psychological care. While metacognitive therapy addresses the attentional and cognitive regulation components, transdiagnostic therapy complements it by focusing on affective components and emotional processing. To date, however, few empirical studies have directly compared these two approaches in adults with ADHD, particularly in relation to alexithymia—a critical yet underexplored facet of the disorder.

The present study aims to fill this gap by systematically evaluating and comparing the effectiveness of metacognitive therapy and transdiagnostic therapy in reducing alexithymia among adults with ADHD symptoms.

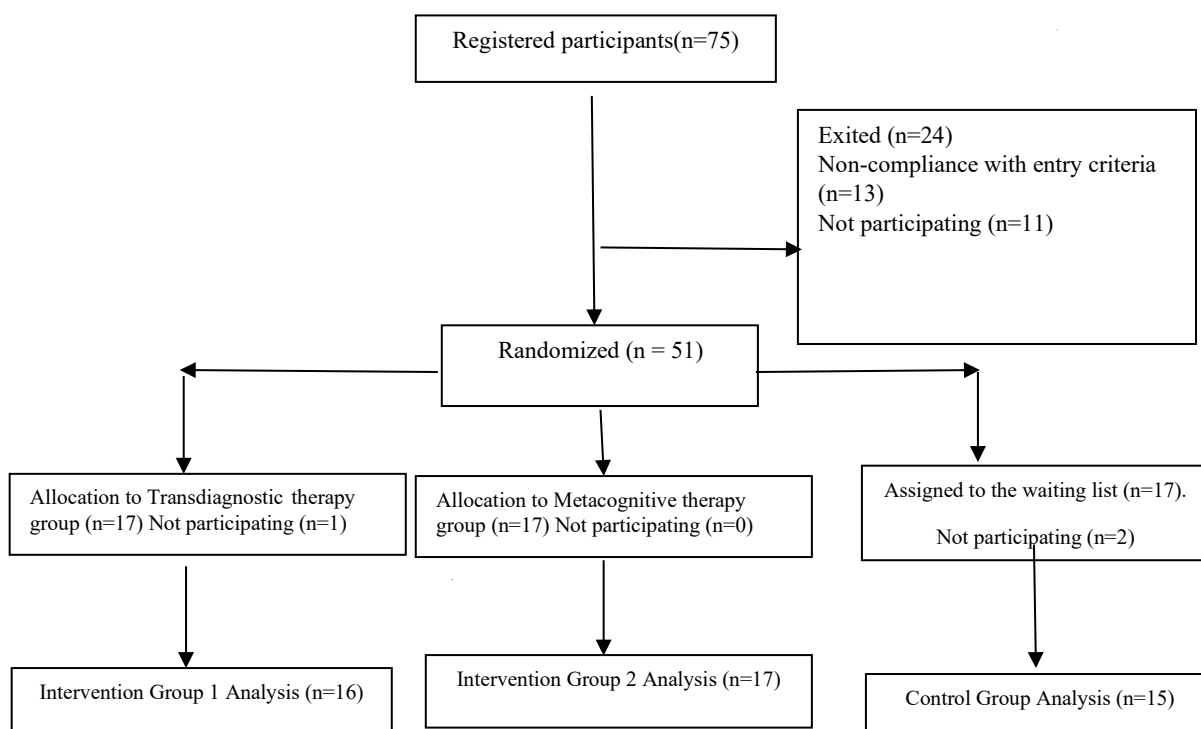
2. Methods and Materials

Figure 1

The CONSORT flow diagram of the study

2.1. Study Design and Participants

This study utilized a semi-experimental design featuring a pre-test and post-test control group format to evaluate the effectiveness of two psychological interventions—metacognitive therapy and transdiagnostic therapy—on adults experiencing symptoms of Attention-Deficit/Hyperactivity Disorder (ADHD) with comorbid alexithymia. The target population consisted of adult individuals diagnosed with ADHD in 2024 and referred to psychology and psychiatric centers across Damavand city. Purposive sampling was employed to select participants from those already attending these centers for ADHD-related treatment. Based on statistical power calculations conducted using G*Power software ($\alpha = 0.05$, power = 0.80, and effect size = 0.50), a minimum of 15 participants per group was necessary. Accounting for an anticipated dropout rate of approximately 17%, a total of 51 participants were initially recruited and randomly assigned to one of three groups: metacognitive therapy ($n = 17$), transdiagnostic therapy ($n = 17$), or control ($n = 17$). The inclusion criteria specified that participants must have a formal ADHD diagnosis, be literate, and be free of any co-occurring physical or psychological conditions that could confound the treatment. Participants were also required not to be involved in any other concurrent interventions, demonstrate willingness to cooperate, and provide informed written consent. Individuals were excluded from the study if they missed more than two therapy sessions or withdrew their consent at any point. Following pre-test assessment (T1), each group received their respective interventions over several weeks. The metacognitive therapy group participated in eight weekly sessions lasting 60 minutes each, while the transdiagnostic therapy group completed ten weekly sessions of 75 minutes each. Both interventions were conducted at the designated psychological centers under the supervision of trained therapists. The control group did not receive any intervention during the study period. After the conclusion of the sessions, all groups completed a post-test assessment (T2). Following attrition, data from 48 participants were analyzed: 15 in the control group, 17 in the metacognitive group, and 16 in the transdiagnostic group. Ethical standards were maintained throughout the study, including confidentiality, voluntary participation, and post-study provision of treatment for the control group.



2.2. Measures

The primary instrument used to assess ADHD symptoms was the Conners' Adult ADHD Rating Scales–Self-Report (S-ADHD), developed by Conners, Erhardt, and Sparrow (2012). This questionnaire was specifically designed to evaluate adult ADHD across three core symptom domains: inattention, hyperactivity-impulsivity, and a general ADHD index. The scale consists of several items rated on a 4-point Likert scale ranging from 0 (“not at all”) to 3 (“very much”), providing both domain-specific and composite scores. A T-score threshold of 60 or above was indicative of clinically significant ADHD symptoms. The S-ADHD has been widely validated and demonstrates strong psychometric properties, with internal consistency coefficients typically ranging from 0.80 to 0.90. Factor analyses (both exploratory and confirmatory) support the three-domain structure. The Persian translation of the scale has also been validated in Iran, exhibiting a diagnostic validity of 0.58 and high convergent validity with the Depression, Anxiety, and Stress Scale (DASS-21). In this study, the internal consistency of the instrument was reaffirmed, with a Cronbach’s alpha coefficient confirming its reliability. The S-ADHD was used both at the pre-test and post-test stages to ensure consistency in measurement and allow comparison across time points and between groups.

To measure alexithymia, the study employed the Toronto Alexithymia Scale (TAS-20), originally developed by

Bagby, Parker, and Taylor (1997). This self-report instrument comprises 20 items designed to evaluate three core facets of alexithymia: difficulty identifying feelings, difficulty describing feelings, and externally oriented thinking. Each item is rated on a 5-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”), yielding a total score between 20 and 100. Higher scores indicate greater levels of alexithymia. The Persian version of the TAS-20 was validated by Besharat (2008), who reported a Cronbach’s alpha of 0.85 for the total scale and coefficients of 0.82, 0.75, and 0.72 for the respective subscales. Furthermore, the test-retest reliability over a four-week interval yielded values between 0.80 and 0.87. In the present study, the internal consistency of the scale was re-evaluated and yielded a Cronbach’s alpha of 0.84, demonstrating the reliability and stability of the instrument within the sample population. This measure was utilized at both the pre-test and post-test phases to assess changes in participants’ emotional processing and awareness resulting from the interventions.

2.3. Interventions

The metacognitive therapy protocol comprised eight structured sessions aimed at addressing maladaptive cognitive processes in adults with ADHD. The first session introduced foundational concepts about adult ADHD, including how the disorder affects various aspects of life

such as academic performance, occupational functioning, and social relationships. Group rules were established, and participants were encouraged to commit to the therapeutic process by engaging with assignments and maintaining regular attendance. In the second session, participants were guided to reflect on their emotional experiences from the previous two weeks. A metacognitive assessment was conducted to identify antecedent thoughts that contributed to worry, rumination, and a heightened sense of threat. The cognitive-attentional syndrome was introduced as a conceptual framework, and its components—such as selective attention, threat monitoring, and repetitive negative thinking—were discussed in relation to ADHD symptomatology. Participants also explored their metacognitive beliefs and coping strategies. The third session focused on deepening the participants' understanding of metacognitive therapy itself. Using diagrams and clinical case examples, the structure and goals of treatment were clarified. This session also helped normalize participants' experiences and fostered group cohesion. In session four, the transition from conceptual understanding to behavioral change began. Through Socratic dialogue, participants examined the ineffectiveness of worry-suppression strategies and engaged in a "thought suppression experiment" to experience firsthand how such attempts often backfire. The relationship between rumination and worsening ADHD symptoms was highlighted. The fifth session challenged beliefs about the uncontrollability of thoughts and introduced the concept of detached mindfulness—observing thoughts without engaging or reacting to them. Participants practiced this skill as a replacement for rumination. Session six centered on attention training techniques designed to shift focus away from distressing internal cues. Participants examined the perceived dangers of worry and rumination and were taught to differentiate between stress and anxiety, with stress reframed as an adaptive evolutionary response. The seventh session involved challenging beliefs about the usefulness of worry and rumination using verbal re-attribution and cognitive dissonance techniques. Finally, in session eight, participants developed personalized cognitive processing plans aimed at sustaining gains and preventing relapse. They were encouraged to reflect on their therapeutic progress, especially in terms of how their engagement with intrusive thoughts and ADHD symptoms had evolved over the course of treatment.

The transdiagnostic therapy followed a ten-session format rooted in the Unified Protocol model, designed to

target emotional dysregulation across disorders, including ADHD with comorbid alexithymia. The first session emphasized establishing a collaborative therapeutic alliance by using motivational interviewing techniques to enhance participant engagement. This session also outlined the rationale for treatment and introduced therapy goals. In the second session, psychoeducation was provided on recognizing and labeling emotions, tracking emotional experiences in daily life, and understanding the three-component model of emotional response, which includes cognitive, physiological, and behavioral dimensions. Session three involved emotional awareness training, where participants learned to observe their emotions non-judgmentally and in real time, with a particular emphasis on incorporating mindfulness exercises to enhance introspective accuracy. The fourth session addressed cognitive appraisal and reappraisal by helping participants identify automatic thoughts, recognize common cognitive distortions, and improve cognitive flexibility. Techniques for restructuring maladaptive thoughts were practiced to encourage adaptive emotional responses. In session five, participants explored various strategies of emotional avoidance, such as distraction, suppression, or substance use. They analyzed how these tactics impacted their emotional lives, often exacerbating distress, and learned the importance of emotional acceptance. Session six shifted the focus to emotion-driven behaviors, enabling participants to identify behavioral patterns rooted in emotional impulses. They worked on generating alternative, more adaptive responses through planned confrontations with emotionally charged situations. The seventh session built upon this by developing awareness and tolerance for uncomfortable physical sensations associated with emotions. Through visceral confrontation techniques, participants practiced enduring bodily cues without engaging in avoidance. Sessions eight and nine extended this exposure work into situational contexts. A hierarchy of feared or avoided emotional situations was developed, and participants engaged in structured exposure exercises aimed at dismantling avoidance behaviors and reinforcing emotional resilience. The final session, session ten, was dedicated to relapse prevention. Participants reviewed their progress, consolidated core treatment skills, and developed long-term strategies for maintaining emotional regulation and preventing symptom recurrence. The therapy concluded with a discussion on how to integrate the learned strategies into everyday life for sustained emotional and functional improvement.

2.4. Data Analysis

The collected data were analyzed using both descriptive and inferential statistical techniques to examine the effects of the therapeutic interventions. Statistical analyses were conducted using SPSS version 27. Descriptive statistics (mean, standard deviation) were calculated to summarize demographic and clinical characteristics of the sample. For hypothesis testing, univariate and multivariate analyses of covariance (ANCOVA and MANCOVA) were conducted to assess the differences between the experimental and control groups while controlling for pre-test scores. Bonferroni post hoc comparisons were employed to identify specific between-group differences following significant omnibus tests. The assumptions of ANCOVA, including the homogeneity of regression slopes and the homogeneity of variances, were checked and met. The interaction term between pre-test scores and group assignment was non-significant ($P = 0.391$), indicating that the assumption of

homogeneity of regression slopes was satisfied. Additionally, Levene's test yielded non-significant results, confirming equal variance across groups. These robust statistical procedures ensured that the comparisons of post-test outcomes were not confounded by baseline differences, and that the findings regarding the effectiveness of the interventions were both valid and reliable.

3. Findings and Results

Forty-eight participants (aged 20-50 years) were divided into three groups: a metacognitive therapy group ($n = 16$, mean age = 33.06 ± 9.18 years), a Transdiagnostic therapy group ($n = 17$, mean age = 32.94 ± 7.86 years), and a control group ($n = 15$, mean age = 31.33 ± 8.13 years). Chi-square tests revealed no significant differences between the groups regarding age, gender, education, or financial status ($P > 0.05$), confirming demographic comparability.

Table 1

Mean and standard deviation of alexithymia in experimental and control groups

Variable	Groups	Status	Mean $\pm$ SD	Shapiro-Wilk	P
alexithymia	control	Pre-test	66.93 $\pm$ 7.65	0.89	0.101
		Post-test	65.87 $\pm$ 7.34	0.89	0.103
	metacognitive therapy	Pre-test	69.06 $\pm$ 8.83	0.89	0.105
		Post-test	63.25 $\pm$ 8.43	0.92	0.167
	metacognitive therapy	Pre-test	69.65 $\pm$ 10.23	0.92	0.172
		Post-test	58.88 $\pm$ 8.54	0.93	0.233

Table 1 displays the mean and standard deviation of the alexithymia scores for both the experimental and control groups at the pre-test and post-test stages. Additionally, the

Shapiro-Wilk test results for both groups during the pre-test and post-test phases are not significant, indicating that the distribution of the alexithymia variable is normal ($P > 0.05$).

Table 2

Results of analysis of covariance for comparing metacognitive therapy and Meta diagnostic therapy in improving alexithymia

Source of changes	SS	df	MS	F	P	Eta
Pretest	2537.25	1	2537.25	248.50	< 0.001	0.85
Group	673.33	2	336.67	32.97	< 0.01	0.60
Error	449.25	44	10.21			
Total	191013	48				

Table 2 presents the results of the analysis of covariance (ANCOVA) comparing alexithymia scores in the metacognitive and Transdiagnostic therapy groups during the post-test phase. The F value is 32.97, with a significance level of less than 0.01 ($P < 0.01$). Therefore, the null

hypothesis is rejected, and the research hypothesis is supported, indicating a significant difference in the effectiveness of the two therapies in improving the alexithymia among adults with ADHD. The specific

difference between the two treatments was further examined using the Bonferroni test.

Table 3

Results of the Bonferroni test to determine the difference between metacognitive therapy and Meta diagnostic therapy in improving alexithymia

Variable	Groups		Mean Difference	Standard Deviation	P
alexithymia	control	Metacognitive therapy	*4.39	1.15	0.001
		Transdiagnostic therapy	*9.24	1.14	0.001
	Transdiagnostic therapy	Metacognitive therapy	*-4.85	1.11	0.001

As shown in Table 3, the Bonferroni test results indicate a significant difference between the control group and both the metacognitive and Transdiagnostic therapy groups in improving the alexithymia ($P < 0.001$). This suggests that both therapies effectively increased alexithymia compared to no treatment. Additionally, there was a significant difference between the two treatment groups themselves ($P < 0.05$), with the Transdiagnostic therapy group demonstrating a greater effect—reflected by a mean difference of -4.85—on the alexithymia of adults with ADHD symptoms.

4. Discussion and Conclusion

The current study aimed to compare the effectiveness of metacognitive therapy (MCT) and transdiagnostic therapy (TDT) in improving alexithymia among adults with ADHD symptoms. The results provided strong evidence supporting the effectiveness of both interventions, with statistically significant reductions in alexithymia scores observed in the two experimental groups compared to the control group. Notably, the group receiving transdiagnostic therapy exhibited a significantly greater reduction in alexithymia scores than the metacognitive therapy group. These findings highlight that while both interventions can be effective in addressing emotional deficits in ADHD, transdiagnostic therapy may provide a more comprehensive approach to improving emotional awareness and regulation.

The superiority of transdiagnostic therapy in this context can be understood by considering its emphasis on emotion-based mechanisms. TDT incorporates emotional awareness training, cognitive reappraisal, and exposure to avoided emotional experiences—components that are highly relevant to the treatment of alexithymia, which is marked by difficulty in identifying and expressing emotions (Bagby & Parker, 1994). This is consistent with earlier research

showing that transdiagnostic protocols targeting emotion regulation skills significantly improve affective functioning across a range of disorders (Craske & Barlow, 2022; Díaz-García et al., 2021). For example, Tonarely-Busto et al. (2023) successfully applied a transdiagnostic protocol to reduce emotional dysregulation in adolescents with comorbid emotional disorders, supporting the present finding that such interventions are broadly applicable and effective (Tonarely-Busto et al., 2023).

Furthermore, Cuijpers et al. (2023) conducted a meta-analysis demonstrating the efficacy of transdiagnostic interventions in alleviating anxiety and depression, both of which frequently co-occur with ADHD and alexithymia (Cuijpers et al., 2023). The emotional processing model underlying TDT enables patients to tolerate, label, and manage emotional experiences more adaptively, which likely contributed to the significant improvements observed in this study. Similarly, the findings of Vijayapriya and Tamarana (2023), who highlighted the broad utility of dialectical behavior therapy as a transdiagnostic approach to enhance cognitive functions, lend support to the idea that targeting shared emotional mechanisms can improve self-regulatory capacities across domains (Vijayapriya & Tamarana, 2023).

Although metacognitive therapy also significantly reduced alexithymia levels, its effects were less pronounced. MCT focuses primarily on modifying maladaptive metacognitive beliefs and disengaging from unhelpful thinking patterns such as worry and rumination through techniques like attention training and detached mindfulness (Wells & Matthews, 2016). While this framework is beneficial for reducing internalizing symptoms and increasing cognitive flexibility, its indirect approach to emotion recognition and labeling may account for the relatively smaller effect on alexithymia. Nevertheless, prior

research affirms the effectiveness of MCT in emotional regulation. For example, Hashemi et al. (2023) found that MCT significantly decreased alexithymia in individuals with functional gastrointestinal disorders, corroborating the present study's findings (Hashemi et al., 2023).

These outcomes are further supported by the neurocognitive basis of metacognitive impairments in ADHD. Lenartowicz et al. (2024) emphasized the importance of awareness training in modulating cognitive and emotional responses in ADHD patients, aligning with the observed improvements in the MCT group (Lenartowicz et al., 2024). Similarly, Mohammadi et al. (2022) showed that metacognitive therapy reduced behavioral and emotional problems in children with ADHD by improving self-regulation strategies (Mohammadi et al., 2022). However, as alexithymia is fundamentally an emotional-processing disorder, therapies that directly engage emotional awareness and acceptance—such as TDT—may yield more potent outcomes.

Beyond the comparison of the two therapeutic modalities, the overall improvements in both treatment groups underscore the critical role of psychological interventions in managing emotional deficits in adult ADHD. Emotional dysregulation is increasingly recognized as a core feature of ADHD, with implications for functional outcomes across social, academic, and occupational domains (Faraone et al., 2024; Shaw et al., 2014). The present findings support the view that alexithymia is not merely a secondary phenomenon but a central element of the disorder's psychopathology, requiring targeted intervention. ADHD patients with high alexithymic traits are more likely to experience interpersonal conflict, misinterpret social cues, and rely on maladaptive coping strategies, highlighting the importance of early and integrated emotion-focused treatment (Brancati et al., 2023; Singh et al., 2021).

TDT's advantage in the current study may also be attributed to its flexible and modular format, which can be tailored to a broad spectrum of emotional challenges. This versatility has been demonstrated in various clinical settings and populations. For instance, Yan et al. (2022) found that the Unified Protocol for transdiagnostic treatment, delivered online during the COVID-19 pandemic, effectively reduced emotional disorders, emphasizing the approach's adaptability and utility (Yan et al., 2022). Moreover, its focus on emotion-driven behaviors, physical sensations, and emotional exposures provides patients with tangible tools to dismantle avoidance patterns and develop emotional resilience (Barlow et al., 2021).

On the other hand, MCT's cognitive-centric design is well-suited to address the attentional and ruminative aspects of ADHD. Kukla and Lysaker (2020) demonstrated the utility of metacognitive awareness in improving neurocognition and social cognition in psychosis, a finding that suggests a transdiagnostic potential for MCT as well (Kukla & Lysaker, 2020). By improving meta-awareness, patients may become more adept at monitoring their thoughts and disengaging from self-perpetuating negative cognitive cycles. However, while these gains are valuable, they may be insufficient for individuals whose primary dysfunction lies in affective processing, as is the case with alexithymia.

From a neurodevelopmental perspective, the findings also align with studies emphasizing the heterogeneity and chronicity of ADHD symptoms in adulthood. Research by Sibley et al. (2022) and Pagán et al. (2023) has shown that ADHD often persists into adulthood with variable symptom profiles and that emotional dysregulation remains a persistent and impairing component (Pagán et al., 2023; Sibley et al., 2022). Therefore, psychological treatments that address both cognitive and emotional domains, as the current study has attempted to compare, are imperative to meet the complex needs of this population. The fact that both therapies yielded meaningful outcomes suggests that different therapeutic models can be selectively applied or even integrated based on individual symptom presentations and needs.

Despite the promising findings, this study has several limitations that should be acknowledged. First, the sample size was relatively small, which may limit the generalizability of the results to broader populations with ADHD and comorbid alexithymia. Second, the study relied solely on self-report questionnaires to assess both ADHD symptoms and alexithymia. Although these tools are standardized and validated, they are inherently subject to response biases, including social desirability and limited introspective access, particularly in individuals with alexithymia. Third, the interventions were delivered in clinical centers located in a single city, which could limit ecological validity. Additionally, the study did not include follow-up assessments, making it unclear whether the observed effects are sustained over time. Lastly, variables such as medication use, comorbid psychological disorders, and personality traits were not controlled for, all of which could have influenced treatment outcomes.

Future studies should consider expanding the sample size and incorporating participants from multiple geographic and

clinical settings to improve external validity. To address the limitations of self-report measures, researchers could incorporate clinician-administered assessments and behavioral tasks to assess emotional processing more objectively. Longitudinal designs with multiple follow-up points are necessary to examine the durability of therapeutic gains over time and to explore relapse rates or the need for booster sessions. Furthermore, future research could explore the integration of MCT and TDT elements into a hybrid intervention that leverages the cognitive strengths of MCT and the emotional focus of TDT. Comparative studies across different age groups, comorbidities, and neurodiverse populations could also yield insights into differential treatment responsiveness.

Clinicians working with adults with ADHD and alexithymia should consider implementing emotion-focused interventions, particularly transdiagnostic therapy, which has demonstrated superior effectiveness in enhancing emotional awareness and regulation. Mental health centers can offer TDT in both group and individual formats, with potential integration into existing CBT programs. Therapist training programs should emphasize flexible, evidence-based approaches that address both cognitive and emotional dimensions of ADHD. Given the promising results of metacognitive therapy as well, clinicians can personalize treatment plans by assessing each patient's metacognitive beliefs, emotional awareness levels, and coping styles to determine the most appropriate therapeutic pathway. Integration of these approaches into community-based and digital mental health services may further enhance access and effectiveness for diverse adult ADHD populations.

Authors' Contributions

Authors equally contributed to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

All procedures performed in studies involving human participants were under the ethical standards of the institutional and, or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards (Ethics Code: IR.IAU.R.REC.1404.009).

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