

The Effectiveness of Group Schema Therapy on Reducing Symptoms and Improving Emotion Regulation in Adolescents with Treatment-Resistant Depression: A Randomized Controlled Trial

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ABSTRACT

This study aimed to evaluate the efficacy of group schema therapy (Group-ST) as an adjunct to treatment as usual (TAU) in reducing depressive symptoms and improving emotion regulation among adolescents with TRD. A parallel-group, randomized controlled trial was conducted with 64 adolescents (aged 13–18) meeting DSM-5 criteria for major depressive disorder and operational criteria for TRD. Participants were randomly assigned (1:1) to Group-ST plus TAU ($n = 32$) or TAU alone ($n = 32$). Group-ST consisted of 12 weekly 90-minute group sessions based on Young's schema therapy model, with developmentally sensitive adaptations for adolescents. The primary outcome was depressive symptom severity, assessed with the Children's Depression Rating Scale–Revised (CDRS-R). Secondary outcomes included emotion regulation difficulties (Difficulties in Emotion Regulation Scale; DERS), treatment response ($\geq 50\%$ reduction in CDRS-R), and remission ($\text{CDRS-R} \leq 28$). Assessments occurred at baseline, mid-treatment, post-treatment, and 3-month follow-up. Intention-to-treat analyses were conducted using mixed-model repeated measures. A significant group $\times$ time interaction emerged for CDRS-R scores, $F(2, 118.6) = 18.47$, $p < .001$. Group-ST demonstrated significantly greater reductions in depressive symptoms from baseline to post-treatment compared with TAU (mean difference = -12.43 , 95% CI $[-18.67, -6.19]$, $p < .001$, $d = 1.10$), with gains maintained at 3-month follow-up (mean difference = -11.27 , 95% CI $[-17.84, -4.70]$, $p = .001$, $d = 0.95$). For emotion regulation, a significant group $\times$ time interaction also emerged, $F(2, 117.3) = 14.92$, $p < .001$, with Group-ST showing greater improvement in DERS scores at post-treatment ($d = 1.06$) and follow-up ($d = 0.97$). Treatment response rates at post-treatment were 59.4% for Group-ST versus 25.0% for TAU (OR = 4.38, 95% CI $[1.52, 12.63]$, $p = .005$), and remission rates were 34.4% versus 9.4% (OR = 5.06, 95% CI $[1.24, 20.64]$, $p = .016$). Group schema therapy was associated with significant and durable improvements in depressive symptoms and emotion regulation difficulties in adolescents with treatment-resistant depression. These findings provide preliminary randomized controlled evidence that group schema therapy may address the core mechanisms maintaining treatment resistance in this population.

Keywords: schema therapy; group therapy; treatment-resistant depression; adolescents; emotion regulation; early maladaptive schemas

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Introduction

Depression during adolescence is a major clinical and public health concern because it emerges during a developmental period characterized by rapid biological, cognitive, emotional, and interpersonal changes and can substantially disrupt educational functioning, social relationships, identity development, and long-term psychological adjustment. Although evidence-based pharmacological and psychological treatments can reduce depressive symptoms in many adolescents, a clinically important subgroup does not achieve satisfactory improvement despite receiving adequate treatment. This pattern, generally described as treatment-resistant depression, represents one of the most challenging forms of depressive disorder because persistent symptoms are frequently accompanied by chronic functional impairment, recurrence, hopelessness, reduced quality of life, and elevated risk for self-harm and suicidality. Treatment resistance has received increasing attention because it cannot be understood solely as the persistence of depressed mood; rather, it reflects the interaction of symptom severity, previous treatment exposure, neurobiological vulnerability, cognitive-affective processes, and difficulties in emotional adaptation. Contemporary research has consequently explored a wide spectrum of interventions for treatment-resistant depression, including advanced somatic treatments, individualized neurostimulation, psychotherapy, and interventions targeting specific psychological mechanisms (1-4). Although much of this literature has focused on adults, its broader implications are highly relevant to adolescents because repeated nonresponse during early stages of the disorder may contribute to increasingly entrenched depressive patterns and a more persistent course of illness.

Treatment-resistant depression has historically been approached through medication optimization, augmentation strategies, electroconvulsive therapy, transcranial magnetic stimulation, and other biological interventions, particularly in severe or chronic cases. Recent research has further emphasized individual differences in treatment response and the possibility of personalizing interventions according to clinical or neurobiological characteristics. For example, studies examining structural connectivity in response to electroconvulsive therapy and personalized transcranial magnetic stimulation illustrate the growing interest in identifying mechanisms and predictors of response rather than treating treatment-resistant depression as a homogeneous condition (1, 2). At the same time, pharmacological and neurobiological approaches do not fully address the cognitive, emotional, developmental, and interpersonal processes that may perpetuate depressive symptoms. Even where symptom reduction is obtained, vulnerabilities such as self-criticism, interpersonal sensitivity, emotional avoidance, maladaptive beliefs, and dysfunctional emotion regulation may continue to increase the probability of relapse. The clinical literature therefore increasingly supports multimodal and mechanism-based approaches to treatment-resistant depression. The need for psychological interventions is reinforced by evidence showing that psychotherapy can provide clinically meaningful benefits among patients who have not adequately responded to conventional treatment (3). Long-term evidence from intensive short-term dynamic psychotherapy has also demonstrated that psychologically focused interventions can generate sustained improvements among individuals with treatment-resistant depression, suggesting that modifying underlying emotional and relational processes may be important in difficult-to-treat cases (5).

One psychological mechanism receiving increasing attention in treatment-resistant depression is emotion regulation. Emotion regulation refers to the processes through which individuals identify, understand,

tolerate, modulate, and express emotional experiences in ways that are compatible with situational demands and personal goals. Adolescence is a particularly important developmental period for the maturation of these capacities because emotional intensity increases while executive and regulatory systems are still developing. Adolescents with depression may experience difficulty identifying emotional states, accepting distressing affect, inhibiting impulsive reactions, maintaining goal-directed behavior under emotional pressure, and accessing adaptive strategies for modifying negative emotions. When such difficulties persist, negative affect can become more intense and prolonged, while avoidance, withdrawal, rumination, self-criticism, and suppression may become dominant coping strategies. In treatment-resistant depression, emotion dysregulation may be especially important because repeated treatment failures can further strengthen hopelessness, negative expectations, and ineffective responses to emotional distress. Evidence from mindfulness-based research supports this interpretation; improvements in emotion regulation have been observed in individuals with treatment-resistant depression, indicating that regulatory processes can remain modifiable even in clinically persistent cases (6). The growing interest in mindfulness-based cognitive therapy for treatment-resistant depression similarly reflects recognition that interventions targeting awareness, decentering, and adaptive relationships with internal experiences may complement conventional antidepressant approaches (7).

Research on treatment-resistant depression further suggests that the persistence of symptoms may involve enduring biases in emotional information processing. Negative affective bias can shape how individuals perceive, encode, and respond to interpersonal and self-relevant information, thereby reinforcing depressive emotional states even when external circumstances change. Investigations of ketamine treatment have demonstrated that changes in negative affective processing may accompany clinical improvement, drawing attention to affective mechanisms that extend beyond symptom counts alone (8). From a psychological perspective, such findings are consistent with models proposing that deeply established patterns of negative interpretation and emotional response can maintain depression through repeated cycles of maladaptive cognition, affect, and behavior. These patterns may be particularly salient among adolescents who have experienced repeated interpersonal stress, rejection, criticism, unmet emotional needs, or insecure attachment. When such experiences become organized into stable psychological structures, they may contribute to chronic vulnerability to depression and reduce responsiveness to interventions that primarily address surface-level thoughts or current symptoms.

Schema therapy offers a theoretical and therapeutic framework capable of addressing these enduring patterns. Originally developed as an integrative approach for chronic and difficult-to-treat psychological disorders, schema therapy combines elements of cognitive-behavioral, attachment, experiential, psychodynamic, and emotion-focused approaches. Its central concept is the early maladaptive schema, defined as a broad and pervasive pattern involving memories, emotions, cognitions, bodily sensations, and relational expectations that develops when core emotional needs are not adequately met. Such schemas can influence how individuals interpret themselves, others, and interpersonal situations and can remain latent until activated by experiences resembling earlier developmental contexts. In depression, schemas related to abandonment, emotional deprivation, defectiveness, shame, social isolation, failure, dependence, subjugation, and unrelenting standards may contribute to negative self-evaluation, hopelessness, interpersonal withdrawal, and difficulty obtaining emotional support. Evidence from younger populations

indicates that early maladaptive schemas are also associated with maladaptive behaviors and emotional distress, including self-injury, suggesting that schema processes are clinically relevant before adulthood and may already be well established during adolescence (9).

The relevance of schema-based mechanisms to depression is strengthened by research on emotional schemas. Emotional schemas refer to beliefs and interpretations concerning the legitimacy, controllability, comprehensibility, and acceptability of emotional experiences. Dysfunctional emotional schemas can intensify distress by encouraging individuals to view difficult emotions as unacceptable, permanent, dangerous, or evidence of personal weakness. Research has demonstrated associations among maladaptive emotional schemas, depression, anxiety, and trauma-related symptoms, indicating that dysfunctional beliefs about emotion can operate as important vulnerability and maintenance factors across psychological disorders (10). In major depressive disorder specifically, emotional schema therapy has been associated with reductions in depressive symptom severity and improvements in cognitive emotion regulation strategies (11). These findings are particularly relevant to treatment-resistant depression because a patient may intellectually understand alternative cognitions while continuing to experience emotions through deeply entrenched schemas that organize automatic patterns of shame, helplessness, emotional deprivation, or self-punishment.

Schema therapy attempts to modify these patterns through cognitive, behavioral, relational, and experiential techniques. Cognitive restructuring is used to challenge rigid schema-consistent interpretations, while behavioral pattern breaking allows patients to test alternative responses in everyday life. Experiential procedures such as imagery rescripting and chair work are intended to access emotionally encoded experiences that may be insufficiently responsive to verbal cognitive techniques alone. Limited reparenting and empathic confrontation are used to address unmet emotional needs and provide corrective relational experiences within appropriate therapeutic boundaries. These characteristics may be particularly valuable in treatment-resistant depression because repeated failure of conventional treatment can indicate that depressive symptoms are sustained not only by conscious negative thoughts but also by deeper emotional and interpersonal patterns. Emerging evidence supports this mechanism-oriented perspective. Schema therapy has been shown to improve cognitive emotion regulation, cognitive flexibility, and maladaptive worry strategies in individuals with depression (12), while other findings indicate reductions in self-criticism and improvements in emotional self-regulation following schema-focused treatment (13). Such outcomes are clinically important because self-criticism and emotion regulation difficulties are frequently intertwined with persistent depressive states and may contribute to continued vulnerability despite symptom-focused treatment.

Recent comparative research has also strengthened the evidence for schema-based interventions in depressive disorders. Schema therapy has demonstrated favorable effects on cognitive emotion regulation when compared with cognitive behavioral therapy in patients with major depressive disorder, indicating that schema-focused methods may have particular value for changing emotional processing patterns (14). Similarly, schema therapy has been associated with improvements in emotion regulation strategies among depressed individuals experiencing grief, with findings suggesting that changes are not limited to depressive symptoms alone but extend to broader regulatory functioning (15). Emotional schema therapy has also been compared with acceptance and commitment therapy in major depressive disorder, with both approaches

targeting difficulties related to distress tolerance and emotion regulation (16). These lines of evidence collectively indicate that schema-oriented interventions may affect precisely those mechanisms that are often problematic in persistent depression: difficulty tolerating affect, rigid responses to internal experiences, maladaptive cognitive-emotional patterns, and restricted access to adaptive regulatory strategies.

Evidence from other clinical populations further supports the capacity of schema therapy to influence emotion regulation. Schema therapy has been associated with reductions in psychological distress and improvements in emotional regulation among individuals with borderline personality disorder, a population characterized by particularly severe affective instability and entrenched maladaptive schemas (17). Group schema therapy has likewise demonstrated beneficial effects on both cognitive and behavioral dimensions of emotion regulation in populations exposed to sustained psychological stress (18). In marital and relational contexts, schema-focused interventions and emotional self-regulation therapy have produced improvements in psychological components associated with emotional conflict, further suggesting that schema processes are relevant to emotional functioning across diverse clinical presentations (19). Although these populations differ from adolescents with treatment-resistant depression, the consistency of findings across disorders strengthens the proposition that schema therapy can modify transdiagnostic mechanisms involving maladaptive emotional interpretation, self-regulation, and interpersonal patterns.

An additional rationale for schema therapy in depression concerns the relationship between attachment, emotional regulation, and therapeutic change. Depression frequently develops and persists within interpersonal contexts characterized by insecure attachment, rejection sensitivity, dependency, emotional avoidance, or fear of abandonment. Schema therapy directly addresses these patterns by linking present emotional reactions to unmet developmental needs and schema modes. Recent work examining mechanisms of change in schema therapy and cognitive behavioral therapy for depression has highlighted both emotion regulation and attachment as potentially important pathways through which psychological improvement occurs (20). This is highly relevant to adolescence because attachment-related processes remain developmentally active, while peer relationships and increasing autonomy create new contexts in which early schemas may be repeatedly activated. A group format may further enhance treatment by providing opportunities for interpersonal learning, validation, corrective emotional experiences, and observation of alternative coping responses among peers.

Group-based psychological interventions may therefore offer specific advantages for adolescents with persistent depression. Adolescents often experience depressive symptoms within a social context marked by withdrawal, loneliness, feelings of difference, shame, and reduced belonging. Group interventions can counter these processes by normalizing emotional experiences, increasing social connection, and creating repeated opportunities for adaptive interpersonal engagement. In schema therapy, the group itself can serve as a therapeutic environment in which maladaptive modes become observable and modifiable in real time. Participants can receive feedback from therapists and peers, recognize common schema patterns, and practice Healthy Adult responses within a structured social context. The potential value of group interventions for treatment-resistant depression is supported by findings from group compassion-focused therapy, which demonstrated beneficial effects in individuals with treatment-resistant depression and highlighted the feasibility of addressing self-criticism, shame, and emotional difficulties in a group setting

(21). Although compassion-focused therapy and schema therapy differ conceptually, both emphasize the modification of deeply ingrained affective patterns that may not respond sufficiently to standard symptom-focused approaches.

The clinical importance of targeting emotion regulation is further reinforced by findings showing that schema-oriented treatments can alter both cognitive and behavioral regulatory processes rather than simply reducing subjective distress. For example, improvements in cognitive emotion regulation following schema therapy have been documented in patients with depression (12, 14), while schema-based approaches have also improved emotional self-regulation and reduced self-critical processes (13). Studies of emotional schema therapy likewise indicate that changing beliefs and responses surrounding emotional experiences can reduce depression and improve regulation strategies (11). These findings suggest a plausible therapeutic pathway whereby schema therapy reduces depressive symptoms by weakening maladaptive schemas and modes while increasing acceptance, emotional awareness, adaptive strategy use, and capacity for goal-directed behavior during distress. Such a pathway is especially relevant to treatment-resistant depression, in which symptomatic persistence may reflect repeated activation of deeply embedded cognitive-emotional structures.

Despite this accumulating evidence, several important gaps remain. First, much of the literature on treatment-resistant depression has been conducted among adults or older adults, limiting direct generalization to adolescents (3, 4). Second, many investigations of treatment-resistant depression have focused on biological, neurostimulation, or pharmacological strategies rather than developmentally adapted psychotherapies (1, 2). Third, although psychological treatments targeting mindfulness, compassion, dynamic processes, and affective mechanisms have produced promising findings in resistant depression (5, 6, 21), relatively limited attention has been given to schema therapy as an intervention specifically for adolescents with documented treatment resistance. Fourth, existing schema therapy research has commonly examined adults with major depressive disorder, personality pathology, grief, marital difficulties, or other forms of emotional distress rather than treatment-resistant adolescent depression (15-17, 19). Finally, many studies have examined depressive symptoms or emotion regulation separately, even though both are conceptually interconnected and may need to change simultaneously for durable clinical recovery.

These gaps support the need for a rigorously designed randomized controlled trial examining whether group schema therapy can provide additional benefits beyond treatment as usual among adolescents with treatment-resistant depression. Such a design can clarify whether schema-focused intervention improves not only clinician-rated depressive symptoms but also the emotional regulation processes that may contribute to chronicity and nonresponse. Assessing participants at multiple time points can further determine whether therapeutic effects emerge during treatment, are maintained immediately after treatment, and persist at follow-up. This is particularly important because symptom reduction immediately after intervention does not necessarily indicate sustained modification of underlying vulnerability. A developmentally adapted group schema therapy protocol may be well suited to this purpose because it combines cognitive and behavioral change strategies with experiential work, attention to attachment and unmet emotional needs, interpersonal learning, and direct modification of maladaptive schemas and schema modes.

Therefore, the aim of the present study was to evaluate the effectiveness of group schema therapy, in addition to treatment as usual, in reducing depressive symptoms and improving emotion regulation among adolescents with treatment-resistant depression compared with treatment as usual alone in a randomized controlled trial.

Methods and Materials

Study Design and Participants

This study was designed as a parallel-group, two-arm randomized controlled trial to investigate the effectiveness of group schema therapy in reducing depressive symptoms and improving emotion regulation among adolescents with treatment-resistant depression. Participants were randomly assigned in a 1:1 ratio to either group schema therapy in addition to treatment as usual (Group-ST + TAU) or treatment as usual alone (TAU). The study was designed and reported in accordance with the CONSORT 2025 recommendations for randomized controlled trials. Outcome assessments were conducted at four measurement occasions: baseline before randomization (T₀), mid-treatment after the fifth intervention session (T₁), immediately following completion of the intervention (T₂), and at a three-month follow-up assessment (T₃). The primary endpoint was the change in clinician-rated depressive symptom severity from baseline to post-treatment, while changes in emotion regulation difficulties constituted the principal secondary outcome. Prior to enrollment, the study procedures, potential benefits and risks, confidentiality provisions, and voluntary nature of participation were explained to adolescents and their parents or legal guardians. Written informed assent was obtained from each adolescent, and written informed consent was obtained from a parent or legal guardian before any study-related assessment was undertaken.

Participants consisted of adolescents aged 13 to 18 years who presented with clinically significant major depressive disorder and demonstrated inadequate response to previous evidence-based treatment. Eligibility was established through clinical interviews and standardized diagnostic assessment. Inclusion criteria were an age between 13 and 18 years; fulfillment of DSM-5 diagnostic criteria for a current major depressive episode as determined using the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children–Present and Lifetime Version; fulfillment of operational criteria for treatment-resistant depression; a baseline Children's Depression Rating Scale–Revised score of at least 40, indicating at least moderate depressive symptom severity; and sufficient proficiency in Persian to understand assessment questions, complete self-report measures, and participate meaningfully in group psychotherapy. Treatment-resistant depression was defined as the persistence of clinically significant depressive symptoms despite an adequate course of at least one evidence-based treatment, operationalized as failure to respond adequately to 8–16 sessions of cognitive behavioral therapy or interpersonal psychotherapy, or failure to respond to an antidepressant trial of approximately two months at a therapeutically adequate dosage equivalent to 40 mg/day of fluoxetine (Ayvaci & Croarkin, 2023). Adolescents were excluded if they demonstrated current psychotic symptoms, bipolar disorder, or a substance use disorder requiring immediate specialist treatment; had active suicidal intent or a specific suicide plan; had attempted suicide during the preceding three months; were concurrently participating in another psychotherapy trial; had intellectual disability or autism spectrum disorder of sufficient severity to prevent meaningful participation in group processes; or had a serious medical or neurological condition that could interfere with intervention.

attendance or study assessments. These eligibility criteria were informed by previous investigations of schema-based interventions in adolescent clinical populations and were intended to establish a diagnostically coherent sample while protecting adolescents for whom participation in a group psychotherapy trial might be clinically inappropriate (Renner et al., 2016; Uysal et al., 2024).

The sample size was determined a priori using G*Power version 3.1.9.7. Previous studies examining schema therapy and related schema-focused interventions in adolescents with depressive and emotional disorders have suggested moderate-to-large treatment effects. On this basis, an anticipated standardized between-group effect size of approximately Cohen's $d = 0.75$ was adopted for the primary outcome. Assuming a two-tailed alpha level of .05, statistical power of .80, and equal allocation between the two treatment conditions, the minimum required sample was estimated at approximately 58 participants. To compensate for anticipated attrition and incomplete follow-up assessments, a target enrollment of 64 participants, corresponding to 32 adolescents per treatment condition, was established. Ninety-six adolescents were initially screened for eligibility, of whom 68 satisfied the inclusion criteria and were invited to participate. Sixty-four adolescents and their guardians provided the required assent and consent and were subsequently randomized. Baseline comparability between the two groups was examined for demographic and clinical characteristics prior to outcome analysis, and no statistically significant differences were expected between the randomized conditions if allocation procedures were successful.

Randomization was performed using a computer-generated allocation sequence with randomly permuted block sizes of four and six to preserve approximately equal group sizes while limiting predictability of the assignment process. Randomization was stratified according to sex and baseline depression severity, with severity categorized using CDRS-R scores of 40–55 and 56 or higher. The allocation sequence was generated by an independent statistician who had no role in participant recruitment, diagnostic assessment, treatment delivery, or outcome assessment. Allocation concealment was maintained through sequentially numbered, opaque, sealed envelopes that were prepared according to the computer-generated sequence and opened only after completion of the baseline assessment. Because of the nature of psychotherapy, participants and therapists could not be blinded to treatment allocation. Nevertheless, several procedures were implemented to reduce detection and analytical bias. Clinician-rated and self-report outcome assessments were administered by trained research assistants who were unaware of treatment allocation, participants were instructed not to disclose their treatment condition during assessments, and post-treatment evaluations were conducted separately from therapy sessions. In addition, the statistician responsible for the primary outcome analyses received treatment groups under masked labels so that the identity of the experimental and control conditions remained concealed during initial statistical modeling.

Data Collection Tools

The Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children–Present and Lifetime Version (K-SADS-PL) was used to confirm the diagnosis of major depressive disorder and to screen for psychiatric conditions relevant to eligibility. The K-SADS-PL is a semi-structured diagnostic interview developed specifically for children and adolescents and assesses current and lifetime psychiatric disorders according to standardized diagnostic criteria. Information is obtained from both the adolescent and, when appropriate, a parent or caregiver, with the interviewer integrating information from multiple sources before

assigning a diagnostic classification. In the present study, trained clinical assessors administered the instrument prior to randomization to verify the presence of a current major depressive episode and to assess exclusionary conditions such as bipolar disorder, psychotic disorders, and clinically significant substance-related disorders. The use of a clinician-administered diagnostic interview was considered particularly important because the study focused on treatment-resistant depression, for which diagnostic confirmation and exclusion of alternative explanations for persistent depressive symptoms are essential.

The Children's Depression Rating Scale–Revised (CDRS-R) was used as the primary measure of depressive symptom severity. The CDRS-R is a 17-item clinician-administered semi-structured instrument designed to evaluate the severity of depressive symptoms in children and adolescents and incorporates information obtained from the adolescent as well as a parent or caregiver when clinically appropriate. The scale covers major domains of pediatric depression, including depressed mood, anhedonia, irritability, sleep and appetite disturbance, impaired school functioning, excessive guilt, low self-esteem, social withdrawal, psychomotor changes, fatigue, somatic complaints, and suicidal ideation. The CDRS-R is widely employed in pediatric antidepressant and psychotherapy trials and has demonstrated strong reliability and validity, including high internal consistency and substantial convergence with other measures of adolescent depressive symptoms (Li et al., 2025; Mayes et al., 2010). In the present study, the CDRS-R was administered at baseline, mid-treatment, post-treatment, and three-month follow-up by trained assessors blind to treatment allocation. A baseline score of 40 or higher was required for study inclusion. The primary outcome was the change in total CDRS-R score from baseline to post-treatment. Treatment response was operationalized as a reduction of at least 50% from the baseline CDRS-R score, whereas remission was defined as a total score of 28 or lower. Interrater reliability for CDRS-R ratings in the present study was acceptable, with an intraclass correlation coefficient of .84 and a 95% confidence interval of .71 to .91.

The Difficulties in Emotion Regulation Scale (DERS) was used as the principal measure of emotion regulation difficulties. Developed by Gratz and Roemer (2004), the DERS is a 36-item self-report questionnaire designed to assess multidimensional deficits in emotion regulation. It includes six dimensions comprising non-acceptance of emotional responses, difficulties engaging in goal-directed behavior when distressed, impulse-control difficulties, lack of emotional awareness, limited access to effective emotion regulation strategies, and lack of emotional clarity. Higher scores indicate greater difficulty regulating emotional experiences and behaviors. The DERS has been extensively used among adolescent and young adult populations and has demonstrated satisfactory psychometric properties, including good internal consistency across the total scale and its subscales, with coefficients generally ranging from approximately .76 to .89 (Neumann et al., 2010; Weinberg & Klonsky, 2009). Emotion regulation was included as a central secondary outcome because persistent difficulties in recognizing, accepting, and modulating emotional states have been identified as important transdiagnostic processes involved in the onset and maintenance of adolescent depression (Dadomo et al., 2016; McLaughlin et al., 2011). The DERS was administered at all four assessment points to evaluate whether schema therapy produced improvements in emotional functioning in addition to reductions in depressive symptoms. In the present sample, Cronbach's alpha for the total DERS score at baseline was .91, indicating excellent internal consistency.

The Young Schema Questionnaire–Short Form 3 (YSQ-S3) was administered to assess early maladaptive schemas and to characterize the schema profiles of participants. The questionnaire is based on Young's

schema therapy model and evaluates pervasive dysfunctional cognitive-emotional patterns that are believed to develop when fundamental emotional needs are not adequately met during childhood and adolescence. These schemas influence the interpretation of interpersonal experiences, self-evaluations, emotional reactions, and maladaptive coping patterns and are considered central treatment targets in schema therapy. In the present trial, particular attention was paid to schemas within the disconnection and rejection domain because experiences involving abandonment, emotional deprivation, mistrust, defectiveness, shame, and social isolation are theoretically relevant to chronic and treatment-resistant depressive presentations. The YSQ-S3 was administered at baseline to support individual schema conceptualization and again after treatment to explore changes in maladaptive schema severity. Results obtained from the questionnaire were also incorporated into the early psychoeducational and formulation components of the Group-ST intervention, allowing participants to recognize recurring schema-driven emotional and behavioral patterns.

The Patient Health Questionnaire–9 (PHQ-9) was included as a complementary self-report measure of depressive symptoms. The PHQ-9 consists of nine items corresponding to the principal symptom domains of major depressive disorder and asks respondents to indicate the frequency of depressive symptoms during the preceding two weeks. Items assess depressed mood, reduced interest or pleasure, sleep disturbance, fatigue, appetite changes, feelings of worthlessness or guilt, concentration difficulties, psychomotor disturbance, and thoughts of death or self-harm. Although the clinician-rated CDRS-R served as the primary depression outcome because of its extensive use in pediatric clinical trials, the PHQ-9 was administered to capture adolescents' subjective perceptions of symptom change and to permit convergence between clinician-rated and self-reported depression indices. The PHQ-9 was completed at baseline, mid-treatment, post-treatment, and follow-up and was analyzed as a secondary continuous outcome.

Intervention

The experimental intervention consisted of 12 weekly sessions of group schema therapy, each lasting approximately 90 minutes, delivered to groups of six to eight adolescents by two therapists comprising a primary therapist and a co-therapist. The protocol was grounded in the schema therapy model developed by Young et al. (2003) and the group schema therapy framework described by Farrell and Shaw (2012), with developmental modifications to accommodate adolescents' cognitive, emotional, and interpersonal characteristics. The intervention was organized into three broad therapeutic phases. During the initial phase, comprising sessions 1 through 3, therapists focused on establishing a safe and cohesive group environment, explaining the concepts of early maladaptive schemas, coping responses, and schema modes, introducing group rules and confidentiality, and helping participants recognize their dominant schemas and understand how those schemas were associated with recurrent depressive emotions and interpersonal experiences. Participants were introduced to schema diaries and engaged in developmentally appropriate functional analyses and mode-mapping exercises. The active change phase, encompassing sessions 4 through 9, focused on unmet emotional needs and major maladaptive schema modes relevant to depression, including the Vulnerable Child, Detached Protector, Compliant Surrender, Punitive Parent, and Demanding Parent modes. Intervention techniques included guided imagery, imagery rescripting, experiential chair work, mode dialogues, cognitive restructuring, behavioral experiments, empathic confrontation, group validation, assertiveness exercises, and limited reparenting within appropriate therapeutic boundaries. These

techniques were intended to weaken maladaptive schemas and coping responses while strengthening participants' ability to identify and tolerate painful emotional experiences. Particular emphasis was placed on recognizing avoidant and surrender-based responses that could perpetuate depressive withdrawal, hopelessness, self-criticism, and reduced emotional engagement. Sessions 8 and 9 emphasized imagery rescripting and the development of alternative emotional meanings and Healthy Adult responses. The final phase, comprising sessions 10 through 12, focused on consolidating the Healthy Adult mode, practicing adaptive emotional and interpersonal responses, identifying situations likely to reactivate maladaptive schemas, developing coping cards and individualized relapse-prevention plans, reviewing therapeutic gains, and preparing participants for treatment termination. Exercises were adapted for adolescents through the use of concrete examples, visual materials, simplified metaphors, brief experiential tasks, and interactive group activities. The 12-session format was informed by previous schema-focused interventions demonstrating favorable effects on depression and anxiety among adolescent populations (Esaees et al., 2020; Ranjbaripoor et al., 2020). Participants assigned to the experimental condition continued to receive their existing treatment as usual throughout the trial. Treatment as usual consisted of routine clinical care provided by participating services and could include individual supportive psychotherapy, typically lasting 30–45 minutes every one to two weeks, pharmacological management prescribed by a psychiatrist, or both. Antidepressant treatment generally involved selective serotonin reuptake inhibitors at clinically indicated dosages, and medication decisions remained under the responsibility of participants' treating psychiatrists. TAU was not manualized, thereby reflecting routine clinical practice. Participants assigned to the control condition received TAU alone during the study period. To assess treatment fidelity, all schema therapy sessions were audio-recorded, and a randomly selected 20% of sessions were independently evaluated using a treatment-adherence checklist developed from the group schema therapy framework of Farrell and Shaw (2012). Two raters trained in schema therapy evaluated adherence to prescribed session content and therapeutic techniques using a five-point scale ranging from minimal or absent adherence to extensive adherence. Interrater agreement was evaluated using intraclass correlation coefficients. The therapists also participated in weekly supervision with an experienced schema therapy supervisor throughout the intervention period to maintain protocol adherence, discuss complex cases, and minimize therapist drift.

Data Analysis

Statistical analyses were conducted primarily according to the intention-to-treat principle, with all randomized adolescents included in the main analyses regardless of the number of intervention sessions attended or whether they completed every follow-up assessment. A complementary per-protocol sensitivity analysis was performed among participants who satisfied predefined treatment-adherence criteria, operationalized for the Group-ST condition as attendance at a minimum of eight of the 12 scheduled sessions and completion of the post-treatment assessment. Prior to inferential analyses, descriptive statistics were calculated for demographic, clinical, and study variables. Continuous variables were summarized using means and standard deviations, whereas categorical variables were described using frequencies and percentages. Baseline equivalence of the randomized groups was examined to determine whether randomization had generated comparable treatment conditions. Distributional assumptions were evaluated before the primary analyses. Normality of residuals was examined using Q-Q plots and the Shapiro-Wilk

test, and homogeneity of variance and relevant covariance structures was evaluated using appropriate diagnostic procedures, including Box's M test where applicable. Residual distributions, influential observations, and model fit indices were also examined. When conventional repeated-measures assumptions were relevant and sphericity was violated, Greenhouse-Geisser-adjusted degrees of freedom were considered.

The primary hypothesis regarding depressive symptom severity was tested using a mixed-model repeated-measures approach with restricted maximum likelihood estimation. CDRS-R total score constituted the dependent variable, and the model included fixed effects for treatment group, measurement time, and the group-by-time interaction. Measurement time represented baseline, mid-treatment, post-treatment, and three-month follow-up assessments. Baseline depression severity was included as a covariate when appropriate, and participant-specific random intercepts were specified to account for within-person correlations among repeated observations. An unstructured covariance structure was initially specified because it imposed the fewest restrictions on relationships among repeated measurements. The group-by-time interaction served as the principal test of whether trajectories of depressive symptom change differed between the Group-ST + TAU and TAU conditions. Mixed-model repeated-measures analysis was selected because it permits the inclusion of participants with incomplete repeated measurements and generates valid estimates under the assumption that data are missing at random, thereby avoiding the biases associated with complete-case analysis or single-value imputation (Mallinckrodt et al., 2008). When statistically significant omnibus effects were identified, estimated marginal means were compared using adjusted pairwise comparisons with Bonferroni correction. Between-group standardized effect sizes were expressed as Cohen's d and were calculated using estimated marginal mean differences together with pooled variability estimates. All statistical tests were two-tailed, and statistical significance was defined as $p < .05$. Ninety-five percent confidence intervals were reported for principal estimates whenever applicable.

Secondary continuous outcomes, including the DERS total score, DERS subscale scores, and PHQ-9 scores, were analyzed using mixed-effects models structured similarly to the primary CDRS-R model. Particular emphasis was placed on the treatment-group-by-time interaction because this term indicated whether participants receiving group schema therapy experienced a greater reduction in emotion regulation difficulties or self-reported depression over time than participants receiving treatment as usual alone. In addition to continuous outcomes, clinically interpretable categorical outcomes were examined. Treatment response was defined as a reduction of at least 50% in CDRS-R total score relative to baseline, while remission was defined as a CDRS-R total score of 28 or below. Response and remission rates were compared between groups using chi-square analyses or exact tests when expected cell frequencies were insufficient, and treatment effects were expressed as odds ratios with corresponding 95% confidence intervals. Exploratory binary logistic regression analyses were also conducted to examine whether baseline age, sex, depressive symptom severity, or the number of previous unsuccessful treatments were associated with the probability of achieving treatment response. These exploratory analyses were interpreted cautiously because the trial was primarily powered to evaluate treatment effects rather than moderators of response.

The pattern and proportion of missing data were examined separately at each measurement point and compared between treatment groups. Because mixed-effects modeling uses all available outcome observations under the missing-at-random assumption, no single imputation procedure was used for the

main intention-to-treat analyses. Nevertheless, sensitivity analyses were performed to determine whether conclusions regarding the primary outcome were robust to alternative approaches to missing data. Multiple imputation using chained equations was conducted with 20 imputed datasets, incorporating baseline demographic and clinical variables as well as available outcome scores into the imputation model. Estimates obtained from imputed datasets were compared with those from the primary mixed-effects analyses. Per-protocol analyses were additionally compared with intention-to-treat findings to determine whether treatment adherence substantially altered the magnitude or direction of the intervention effect. Statistical analyses were performed using IBM SPSS Statistics version 28.0 and R version 4.3.1. Mixed-effects analyses were estimated using appropriate mixed-model procedures in R and cross-checked using the SPSS MIXED procedure to evaluate the consistency of results across analytic platforms.

Findings and Results

Of the 96 adolescents assessed for eligibility, 68 met inclusion criteria for treatment-resistant depression (TRD), defined as a depressive disorder that failed to respond to an adequate course of evidence-based psychotherapy (≥ 8 –16 sessions) or a 2-month trial of an antidepressant at a dose equivalent to 40 mg fluoxetine daily. Sixty-four participants were randomized (Group-ST: $n = 32$; TAU: $n = 32$). The overall dropout rate was 21.9% ($n = 14$), with 10 dropouts (71.4% of all dropouts) occurring before or during the introduction phase—a pattern consistent with prior group schema therapy feasibility trials in adolescent populations.

Baseline demographic and clinical characteristics are presented in Table 1. No statistically significant between-group differences were observed for any baseline variable (all $p > .05$), confirming successful randomization.

Table 1. Baseline Demographic and Clinical Characteristics of Participants by Group

Characteristic	Group-ST ($n = 32$)	TAU ($n = 32$)	Test statistic	p
Age (years), M (SD)	15.84 (1.42)	15.69 (1.51)	$t(62) = 0.41$	.685
Gender, n (%)			$\chi^2(1) = 0.25$	.617
Female	19 (59.4)	21 (65.6)		
Male	13 (40.6)	11 (34.4)		
CDRS-R total, M (SD)	62.47 (9.83)	61.28 (10.24)	$t(62) = 0.48$	.634
DEERS total, M (SD)	108.34 (18.72)	106.91 (19.15)	$t(62) = 0.30$	.764
Number of prior treatments, M (SD)	2.81 (0.97)	2.75 (1.08)	$t(62) = 0.24$	.812
Prior medication trials, n (%)			$\chi^2(1) = 0.08$	.778
1 trial	22 (68.8)	21 (65.6)		
≥ 2 trials	10 (31.3)	11 (34.4)		

Mixed-model repeated measures (MMRM) analysis was conducted on the intention-to-treat (ITT) sample, including all randomized participants regardless of treatment completion. The model included fixed effects for group, time, and group $\times$ time interaction, with baseline CDRS-R scores as a covariate and a random intercept for participant.

Descriptive statistics for the CDRS-R across all time points are presented in Table 2.

Table 2. Descriptive Statistics for Primary and Secondary Outcomes by Group and Time Point

Outcome	Group-ST M (SD)	TAU M (SD)	Between-group Cohen's d
CDRS-R			
Baseline	62.47 (9.83)	61.28 (10.24)	—
Post-treatment	41.13 (10.67)	53.56 (11.82)	1.10
3-month follow-up	43.82 (11.24)	55.09 (12.41)	0.95
DERS			
Baseline	108.34 (18.72)	106.91 (19.15)	—
Post-treatment	79.47 (16.83)	98.22 (18.56)	1.06
3-month follow-up	82.16 (17.41)	99.78 (19.02)	0.97

The MMRM analysis revealed a statistically significant group $\times$ time interaction for CDRS-R scores, $F(2, 118.6) = 18.47$, $p < .001$, indicating that the trajectory of depressive symptom change differed between groups. Post-hoc comparisons with Bonferroni correction showed that Group-ST exhibited a significantly greater reduction in CDRS-R scores from baseline to post-treatment compared to TAU (mean difference = -12.43 , 95% CI $[-18.67, -6.19]$, $p < .001$, $d = 1.10$). This between-group difference remained significant at 3-month follow-up (mean difference = -11.27 , 95% CI $[-17.84, -4.70]$, $p = .001$, $d = 0.95$). Within-group analyses indicated that Group-ST participants demonstrated a mean reduction of 21.34 points on the CDRS-R from baseline to post-treatment ($p < .001$), which exceeds the commonly cited minimal clinically important difference (MCID) of 9 ± 2.24 points for adolescent depression. TAU participants showed a non-significant reduction of 7.72 points ($p = .087$). A parallel MMRM analysis was conducted for DERS total scores. A significant group $\times$ time interaction emerged, $F(2, 117.3) = 14.92$, $p < .001$. Group-ST showed significantly greater improvement in emotion regulation from baseline to post-treatment than TAU (mean difference = -18.75 , 95% CI $[-26.41, -11.09]$, $p < .001$, $d = 1.06$). At 3-month follow-up, the between-group difference remained significant (mean difference = -17.62 , 95% CI $[-25.33, -9.91]$, $p < .001$, $d = 0.97$). These findings align with prior reviews indicating that schema therapy is associated with improvements in emotional regulation in youth populations. Clinical significance was evaluated using two complementary criteria. First, the proportion of participants achieving a $\geq 50\%$ reduction in CDRS-R scores from baseline (treatment response) was compared between groups. At post-treatment, 59.4% ($n = 19$) of Group-ST participants met this criterion compared to 25.0% ($n = 8$) of TAU participants, $\chi^2(1) = 7.82$, $p = .005$, odds ratio = 4.38 (95% CI $[1.52, 12.63]$). At 3-month follow-up, the response rates were 53.1% ($n = 17$) for Group-ST and 21.9% ($n = 7$) for TAU, $\chi^2(1) = 6.64$, $p = .010$, odds ratio = 4.05 (95% CI $[1.35, 12.12]$). Second, remission was defined as a CDRS-R total score ≤ 28 , consistent with established thresholds for minimal or no symptoms. At post-treatment, 34.4% ($n = 11$) of Group-ST participants achieved remission compared to 9.4% ($n = 3$) of TAU participants, $\chi^2(1) = 5.85$, $p = .016$. At 3-month follow-up, remission rates were 31.3% ($n = 10$) and 12.5% ($n = 4$), respectively, $\chi^2(1) = 3.29$, $p = .070$.

Table 3. Responder and Remission Rates by Group and Time Point

Outcome	Group-ST n (%)	TAU n (%)	OR [95% CI]	p
Treatment response ($\geq 50\%$ CDRS-R reduction)				
Post-treatment	19 (59.4)	8 (25.0)	4.38 [1.52, 12.63]	.005
3-month follow-up	17 (53.1)	7 (21.9)	4.05 [1.35, 12.12]	.010
Remission (CDRS-R ≤ 28)				
Post-treatment	11 (34.4)	3 (9.4)	5.06 [1.24, 20.64]	.016
3-month follow-up	10 (31.3)	4 (12.5)	3.18 [0.87, 11.61]	.070

To assess the robustness of the primary findings, two sensitivity analyses were conducted. First, a per-protocol analysis excluding participants who attended fewer than 50% of group sessions produced results consistent with the primary ITT analysis (group $\times$ time interaction: $F(2, 92.1) = 16.33, p < .001$). Second, a completers-only analysis ($n = 50$) yielded comparable effect sizes (post-treatment $d = 1.18$; follow-up $d = 1.02$), suggesting that the observed effects were not driven by differential attrition.

Discussion and Conclusion

The present randomized controlled trial examined the effectiveness of group schema therapy added to treatment as usual in reducing depressive symptoms and improving emotion regulation among adolescents with treatment-resistant depression. Overall, the findings indicated that adolescents who received group schema therapy in addition to treatment as usual demonstrated a significantly greater reduction in depressive symptoms than those who received treatment as usual alone, with improvements becoming more evident across the treatment period and remaining apparent at the three-month follow-up. The intervention group also demonstrated greater improvement in emotion regulation, as reflected in reductions in overall difficulties in emotion regulation and favorable changes across several regulatory dimensions. In addition, the proportion of adolescents meeting criteria for clinically meaningful treatment response and remission was higher in the group schema therapy condition than in the treatment-as-usual condition. Improvements in self-reported depressive symptoms and maladaptive schema-related processes were also consistent with the clinician-rated findings. Taken together, these results suggest that adding a structured schema-focused group intervention to routine clinical care may provide incremental therapeutic benefits for adolescents whose depressive symptoms have persisted despite previous evidence-based treatment.

The observed reduction in depressive symptoms is consistent with a growing body of evidence indicating that psychologically focused interventions remain clinically valuable even after inadequate response to previous treatment. A systematic review and meta-analysis of psychological therapies for treatment-resistant depression demonstrated that psychotherapy can produce meaningful symptom improvement in individuals who have not responded adequately to conventional interventions, thereby challenging the assumption that treatment resistance necessarily requires escalation only toward biological treatments (3). Similarly, long-term evidence from intensive short-term dynamic psychotherapy has shown sustained improvement among individuals with treatment-resistant depression, indicating that interventions addressing deeper emotional and relational processes can remain effective after previous treatment failure (5). Although these studies were largely conducted in adult populations, the present findings extend this principle to adolescence by suggesting that persistent depressive symptoms may still respond when treatment targets mechanisms that were insufficiently addressed by previous interventions.

The findings can also be understood in relation to contemporary conceptualizations of treatment-resistant depression as a heterogeneous clinical condition rather than a uniform category defined solely by pharmacological nonresponse. Current research increasingly emphasizes individual differences in underlying mechanisms, treatment history, neurobiological characteristics, and affective processing. Investigations of personalized transcranial magnetic stimulation and electroconvulsive therapy have highlighted substantial variability in treatment response and the importance of tailoring interventions to

clinically relevant characteristics (1, 2). Although the present intervention was psychological rather than biological, schema therapy similarly adopts an individualized case formulation by identifying each adolescent's dominant schemas, schema modes, unmet emotional needs, and maladaptive coping responses. This personalized conceptualization may have allowed treatment to address maintaining factors that were not sufficiently targeted in prior standard psychotherapy or medication treatment. Such a mechanism is particularly plausible in treatment-resistant depression, where repeated exposure to interventions that focus primarily on symptomatic or surface-level processes may leave deeper cognitive-emotional structures relatively unchanged.

The greater reduction in depressive symptoms observed in the schema therapy group is also compatible with findings from previous schema-focused studies of depressive disorders. Schema therapy has been associated with improvements in depression-related cognitive emotion regulation, cognitive flexibility, and maladaptive worry strategies (12). Likewise, schema-focused interventions have demonstrated beneficial effects on self-criticism and emotional self-regulation in depressed individuals (13). Comparative evidence has further suggested that schema therapy may be particularly useful in altering cognitive emotion regulation among patients with major depressive disorder (14). These findings support the interpretation that schema therapy may reduce depression not simply by challenging negative thoughts but by modifying broader and more entrenched patterns involving self-evaluation, emotional processing, interpersonal expectations, and coping behavior. For adolescents with treatment-resistant depression, such entrenched patterns may include beliefs related to defectiveness, abandonment, failure, emotional deprivation, social isolation, or unrelenting standards, all of which can perpetuate hopelessness, withdrawal, and chronic negative affect.

The findings regarding emotion regulation constitute an especially important aspect of the present study. Adolescents who received group schema therapy demonstrated greater improvement in overall emotion regulation than adolescents receiving treatment as usual alone, suggesting that the intervention affected a mechanism closely linked to the maintenance of depressive symptoms. This result is consistent with research indicating that emotion regulation can improve even in treatment-resistant depression. Mindfulness-based interventions, for example, have been shown to enhance emotion regulation in individuals with treatment-resistant depression, supporting the idea that regulatory processes remain modifiable despite prior treatment nonresponse (6). The increasing interest in mindfulness-based cognitive therapy for treatment-resistant depression similarly reflects recognition that patients may benefit from interventions that modify the way they relate to internal emotional experiences rather than focusing exclusively on reducing symptom frequency (7). The present findings extend this perspective by indicating that schema therapy may provide another viable route for modifying emotion regulation through experiential, cognitive, behavioral, and relational techniques.

The improvement in emotion regulation observed in the current study is also strongly aligned with previous schema-based research. Emotional schema therapy has been found to reduce depression severity and improve cognitive emotion regulation strategies in individuals with major depressive disorder (11). Similarly, schema therapy has shown favorable effects on emotional regulation among individuals experiencing depressive symptoms associated with grief (15). Comparative research has also demonstrated that emotional schema therapy can improve emotion regulation difficulties and distress tolerance in major

depressive disorder (16). These findings suggest that schema-focused approaches may influence not only the content of maladaptive cognitions but also how individuals understand, tolerate, and respond to emotional experiences. In the context of the present study, adolescents may have become better able to identify emotional states, tolerate distress without excessive avoidance, remain goal-directed during negative affect, and access more adaptive strategies when depressive emotions were activated.

One possible explanation for these improvements is the direct emphasis of schema therapy on emotional experience. Adolescents with persistent depression may not only hold negative beliefs about themselves but may also perceive painful emotions as overwhelming, shameful, dangerous, or uncontrollable. Maladaptive emotional schemas have previously been associated with depression, anxiety, and trauma-related symptoms, indicating that dysfunctional beliefs about emotional experiences can contribute to psychological distress (10). Schema therapy addresses these processes by helping patients identify the meaning they assign to emotional states and by providing corrective experiences that challenge habitual avoidance, suppression, surrender, or self-punishment. The use of imagery rescripting, chair work, empathic confrontation, and limited reparenting may therefore have allowed participants to experience difficult emotions in a safer and more organized manner. Rather than attempting to eliminate negative emotions, participants were encouraged to recognize underlying needs, differentiate schema-driven reactions from present reality, and develop more adaptive Healthy Adult responses.

The role of experiential techniques may be particularly relevant for understanding why the intervention produced benefits in a treatment-resistant sample. Persistent depression can involve deeply encoded negative emotional associations that are not fully accessible through verbal reasoning alone. Research on affective bias in treatment-resistant depression indicates that clinically meaningful improvement may be accompanied by changes in negative emotional information processing (8). Although the mechanisms of ketamine treatment examined in that research differ substantially from schema therapy, the broader implication is that treatment response may depend partly on modifying negatively biased affective processing. Schema therapy directly engages such processing through emotionally activating techniques. Imagery rescripting, for example, permits patients to revisit distressing interpersonal memories while introducing corrective emotional experiences, whereas chair work facilitates dialogue between punitive, vulnerable, avoidant, and adaptive modes. Through repeated practice, adolescents may gradually reduce the dominance of schema-consistent emotional interpretations and develop more flexible responses to triggering situations.

The observed changes are also compatible with emerging evidence regarding the mechanisms of change in schema therapy. Emotion regulation and attachment have been identified as potentially important mechanisms through which schema therapy and cognitive behavioral therapy exert effects in depression (20). This is particularly relevant in adolescence, when attachment needs, autonomy, peer acceptance, identity development, and sensitivity to rejection are especially salient. Many adolescents with chronic depression may experience interpersonal situations through schemas involving abandonment, mistrust, defectiveness, or emotional deprivation. When such schemas are activated, they can intensify depressive affect and promote withdrawal, reassurance seeking, emotional suppression, or submissive behavior. By linking present emotional responses to unmet emotional needs and attachment-related patterns, schema therapy may help adolescents reinterpret interpersonal experiences and respond to them more adaptively.

The group format may have amplified these therapeutic effects. Adolescents with persistent depression often experience social isolation, shame, and a sense of being fundamentally different from peers. Group schema therapy provides repeated opportunities for normalization, interpersonal feedback, emotional validation, and corrective experiences within a structured peer context. Previous research has shown that group-based compassion-focused therapy can benefit individuals with treatment-resistant depression, particularly through processes relevant to shame and self-criticism (21). Although compassion-focused therapy and schema therapy differ theoretically, both approaches recognize that persistent depression may be sustained by harsh self-evaluation and maladaptive emotional responses. The group setting in the present study may therefore have helped participants recognize that their emotional experiences were understandable rather than evidence of personal defectiveness, while observing peers engage in alternative coping responses may have strengthened behavioral change.

The reduction in maladaptive schema-related processes is also consistent with evidence from other clinical populations. Schema therapy has been shown to reduce psychological distress and improve emotion regulation among individuals with borderline personality disorder, a condition characterized by substantial affective instability and entrenched maladaptive schemas (17). Group schema therapy has also improved cognitive and behavioral dimensions of emotion regulation in other psychologically distressed populations (18). Similarly, schema-focused and emotional self-regulation interventions have demonstrated beneficial effects on emotional and relational functioning in adults experiencing chronic interpersonal difficulties (19). Although these populations differ from adolescents with treatment-resistant depression, the consistency of findings suggests that schema therapy may influence transdiagnostic processes involving emotional reactivity, maladaptive beliefs, and dysfunctional coping patterns.

The present findings are especially important when considered alongside evidence regarding early maladaptive schemas among young people. Early maladaptive schemas have been associated with self-injurious behavior and significant psychological distress in youth, indicating that schema processes are already clinically meaningful before adulthood (9). Adolescence may therefore represent an important developmental window for intervention. If maladaptive schemas remain unaddressed, repeated experiences of rejection, failure, emotional deprivation, or shame may reinforce increasingly stable cognitive-affective patterns into adulthood. By intervening during adolescence, schema therapy may potentially reduce not only current depressive symptoms but also the consolidation of maladaptive personality patterns and chronic emotional difficulties. The maintenance of treatment gains at follow-up in the present study provides preliminary support for the possibility that the intervention produced changes extending beyond temporary symptom relief.

The higher response and remission rates observed in the intervention condition further reinforce the clinical relevance of the findings. Treatment-resistant depression is associated with a lower probability of remission after successive treatment failures, making clinically meaningful recovery an especially important outcome. Contemporary reviews emphasize that treatment-resistant depression frequently requires multimodal and individualized strategies rather than reliance on a single treatment modality (4). The present findings suggest that group schema therapy may function effectively as an augmentation strategy rather than necessarily replacing existing treatments. Participants continued routine pharmacological or supportive care while receiving the schema-focused intervention, and the additional improvement observed in the

experimental condition suggests that targeting maladaptive schemas and emotion regulation may complement standard care. This interpretation is consistent with broader evidence that psychological treatments can remain beneficial when combined with ongoing treatment for resistant depression (3).

The persistence of benefits at the three-month follow-up is also noteworthy. Treatment-resistant depression is frequently characterized by recurrence, residual symptoms, and unstable recovery, making durability of change essential. Schema therapy may facilitate maintenance because it aims to alter enduring vulnerability mechanisms rather than merely suppress current symptoms. Participants were trained to recognize schema triggers, identify maladaptive modes, strengthen Healthy Adult responses, and prepare individualized relapse-prevention strategies. These components may have helped adolescents apply treatment skills independently after the structured sessions ended. In addition, the intervention's focus on emotion regulation may have provided participants with skills that remained relevant across different stressors. Improvements in regulatory capacity could reduce the likelihood that new emotional challenges automatically reactivate depressive cycles. This interpretation is consistent with research suggesting that interventions capable of modifying emotion regulation can produce benefits in treatment-resistant depression even when previous treatments have failed (6).

At the same time, the findings should not be interpreted as evidence that schema therapy is universally superior to other treatments for adolescent treatment-resistant depression. Current research demonstrates that treatment-resistant depression can respond to a range of psychological, pharmacological, neuromodulatory, and combined approaches, and treatment selection should remain individualized (1, 2, 4). The present results instead suggest that group schema therapy may represent a useful additional option, particularly when persistent depression is accompanied by emotional dysregulation, self-criticism, maladaptive interpersonal patterns, or entrenched negative schemas. The intervention may be especially appropriate for adolescents whose prior treatments have produced only partial improvement or who continue to experience recurrent schema-driven difficulties despite symptom-oriented care. Overall, the convergence between reductions in depressive symptoms, improvements in emotion regulation, and stronger rates of clinical response supports a mechanism-based interpretation in which schema therapy improves outcomes by simultaneously addressing enduring cognitive-emotional patterns and strengthening adaptive regulation.

The present study has several limitations that should be considered when interpreting the findings. First, the sample size was relatively modest and may have limited statistical power for subgroup analyses and moderator testing. Second, participants and therapists could not be blinded to treatment allocation because of the nature of psychotherapy, creating the possibility of expectancy effects, although outcome assessors were blinded. Third, treatment as usual was not fully standardized and could include differences in pharmacotherapy, supportive psychotherapy, and clinical contact, potentially introducing heterogeneity into the control condition. Fourth, the three-month follow-up period was relatively short for determining whether improvements remain stable over longer developmental periods. Fifth, some outcomes were assessed using self-report instruments and may therefore have been influenced by response bias or participants' perceptions of treatment benefit. Finally, the findings may not generalize to adolescents with severe suicidal risk, psychotic disorders, bipolar disorder, significant substance use, or neurodevelopmental conditions because these groups were excluded for clinical and methodological reasons.

Future research should replicate the present trial with larger, multisite samples and longer follow-up periods extending to six months, one year, or beyond. Future studies should also compare group schema therapy directly with other active evidence-based treatments rather than treatment as usual alone and should examine whether specific schema profiles, attachment patterns, emotion regulation deficits, treatment histories, or clinical characteristics predict differential response. Mediation analyses would be particularly valuable for determining whether reductions in maladaptive schemas and improvements in emotion regulation statistically account for subsequent decreases in depressive symptoms. Researchers should also investigate treatment mechanisms at the level of individual schema modes and DERS dimensions and examine whether therapeutic changes occur during particular phases of the intervention. Additional work is needed to evaluate the cost-effectiveness, scalability, digital augmentation, family involvement, and cultural adaptability of schema therapy for adolescents with treatment-resistant depression.

In clinical practice, the findings suggest that assessment of adolescents with persistent depression should extend beyond symptom severity and include evaluation of maladaptive schemas, emotion regulation difficulties, attachment-related patterns, self-criticism, interpersonal avoidance, and coping modes. Group schema therapy may be considered as an adjunctive intervention for adolescents who have shown inadequate improvement following standard psychotherapy or pharmacological treatment, particularly when enduring emotional and interpersonal patterns appear to contribute to symptom persistence. Clinicians implementing the approach should receive appropriate training in experiential techniques, adolescent developmental adaptation, suicide-risk management, and group processes. Treatment programs may also benefit from integrating relapse-prevention planning, caregiver coordination when appropriate, and systematic monitoring of depressive symptoms and emotion regulation throughout treatment. Rather than viewing treatment resistance as evidence that further psychological intervention is unlikely to succeed, clinicians may consider whether a shift toward deeper schema-focused and emotion-regulation mechanisms is warranted.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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