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The Effectiveness of a Unified Transdiagnostic Cognitive and Emotional Self-Regulation Program on Reducing Externalizing Problems in Preschool Children with Behavioral Disorders

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ABSTRACT

Externalizing behavior problems in preschool children may represent part of normal developmental behaviors; however, if they persist, they can lead to serious psychological and social difficulties in the future. Deficits in emotional self-regulation are key factors in the development of such problems. The present study aimed to investigate the effectiveness of a unified program based on transdiagnostic treatment, focusing on teaching cognitive and emotional self-regulation skills, in reducing externalizing behavior problems among preschool children with behavioral disorders. An experimental single-subject design was employed and conducted in a preschool center in Shahrekord. The statistical population consisted of all preschool children aged 5 to 6 years with behavioral disorders who were enrolled in preschools in Shahrekord during the 2024-2025 academic year. Sampling was performed through purposive sampling based on specific criteria. The research instruments included the Achenbach Child Behavior Checklist (1991) and the Shields and Cicchetti Emotion Regulation Checklist (1997), completed by mothers during the three phases of baseline, intervention, and follow-up. The intervention program was conducted in ten sessions and consisted of two separate sections for children and parents. The parent sessions lasted 45 to 60 minutes, and the child sessions lasted 20 to 30 minutes. The findings indicated that after implementing this program, the children's behavioral symptoms showed considerable improvement across multiple dimensions, particularly in the externalizing behavior and emotional regulation subscales. The results demonstrated the effectiveness of the unified cognitive and emotional self-regulation program in reducing externalizing behavior problems and improving emotion regulation skills in preschool children.

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Introduction

Externalizing behavior problems encompass a wide range of maladaptive behavioral patterns that, in children, primarily manifest as impulsivity, oppositional behavior, emotional instability, aggression, or irritability (Achenbach et al., 2016). These behavioral patterns, in addition to their negative impact on the child's daily functioning, are associated in the short term with consequences such as interpersonal relationship difficulties and academic inefficiency (Kulkarni et al., 2021).

To better explain these patterns, it is necessary first to refer to the characteristics of behavioral disorders in the preschool period. Behavioral disorders refer to a persistent pattern of oppositional and aggressive behaviors that lead to impairment in children's functioning. Preschool children with behavioral disorders are five times more likely to experience these difficulties later in life (Axelrad et al., 2013). The preschool period is of particular importance because it involves extensive changes in social, cognitive, and behavioral domains, which can significantly affect a child's developing experiences related to school and learning (Yoder & Williford, 2019).

Although such behaviors are considered normative and transient phenomena in early childhood, their persistence and intensity can signal enduring problems that deviate from the natural course of development (Lassen et al., 2025). Furthermore, evidence indicates that externalizing behavior problems frequently co-occur with other psychological disorders, particularly internalizing behavior problems. This comorbidity can lead to broader consequences in personal, academic, social, and mental health domains (Oh et al., 2020).

If these behavioral patterns are not addressed through appropriate early interventions, they may persist throughout development and gradually give rise to more severe difficulties in adulthood (Olivier et al., 2020). Long-term outcomes such as antisocial behaviors (Pagani et al., 2025), engagement in criminal activities (Cammisso et al., 2024), and even vulnerability to suicidal ideation (Duncan et al., 2025) have been documented in this field. Estimates suggest that approximately 6.5% of preschool children experience externalizing behavior problems (Lassen et al., 2025).

In explaining this comorbidity, some researchers have emphasized the role of shared underlying mechanisms across both categories of problems (Oh et al., 2020). In this regard, Santens et al. (2020) identified emotional self-regulation as a transdiagnostic factor contributing to both externalizing and internalizing problems. The transdiagnostic approach, by focusing on shared underlying mechanisms across disorders, encompasses a wide range of emotional and behavioral difficulties (Kennedy et al., 2018). Although the primary goal of this treatment is to reduce emotional problems, given its focus on emotion regulation skills and considering the difficulties children with externalizing behaviors often face in this domain, its effectiveness in reducing behavioral problems has also been supported (Barlow et al., 2017).

To better understand the function of the transdiagnostic approach, it is essential to consider the nature of self-regulation. Self-regulation is a multidimensional construct resulting from the interaction between cognitive and emotional processes, which cannot be fully separated from one another (Edossa et al., 2018). Accordingly, self-regulation is viewed as a multilayered process through which an individual simultaneously responds to emotions while organizing cognitive resources to manage challenging situations. This ability involves processes such as response inhibition, sustained attention, modulation of emotional intensity, and behavioral expression (Liew & Zhou, 2022).

Through emotional self-regulation, an individual can select or modify situations, direct attention, and adjust behavioral and physiological responses. This skill develops by the preschool years and remains relatively stable thereafter (Rademacher & Koglin, 2019). Emotional self-regulation is considered one of the core components of many therapeutic

programs aimed at reducing behavioral problems. In this context, transdiagnostic treatment, while teaching emotion regulation skills, also addresses related cognitive aspects and demonstrates adaptive ways of expressing emotions and behaviors (Ghasemzadeh et al., 2021).

Building on these findings, Grossman and Ehrenreich-May (2020), in a case study, applied transdiagnostic treatment to an eight-year-old child exhibiting anger and irritability symptoms. The results indicated that this intervention was also effective in reducing externalizing behavior problems. In a quasi-experimental study, Arfaoui et al. (2022) implemented emotion-focused cognitive-behavioral therapy among 50 children and adolescents aged 9-18 years with behavioral disorders. This intervention led to a reduction in behavioral problems and improvement in emotion regulation among participants. Similarly, Kakolaki et al. (2024), in a quasi-experimental study, examined the effectiveness of transdiagnostic treatment on behavioral problems in 30 children aged 8-10 years with internalizing symptoms. The results showed a stable decrease in behavioral problems among the experimental group.

Despite growing evidence of the effectiveness of transdiagnostic interventions, limited data are available regarding the impact of this approach on preschool children. This is noteworthy, as the preschool period represents a critical stage in emotional and behavioral development, and early intervention during this stage plays a vital role in preventing the persistence and exacerbation of problems later in life. Moreover, many traditional interventions designed for behavioral problems have not adequately addressed the underlying emotional and cognitive factors contributing to their emergence, highlighting the necessity for research in this area.

Given that transdiagnostic treatment emphasizes shared underlying mechanisms and simultaneously teaches emotional, cognitive, and behavioral regulation, its application as an integrated and effective approach in preventive and therapeutic interventions becomes significant. Accordingly, the present study aimed to examine the effectiveness of an integrated cognitive and emotional self-regulation program based on transdiagnostic treatment in reducing externalizing behavior problems among preschool children with behavioral disorders.

Method

Research Design and Participants

The present study employed an experimental design using a single-subject methodology. The statistical population consisted of all preschool children aged 5 to 6 years with behavioral disorders who were enrolled in preschools in Shahrekord during the 2024–2025 academic year. Sampling was conducted through a purposive method based on specific inclusion criteria. Initially, among the preschools in Shahrekord, the “Shaghayegh” preschool which expressed willingness to cooperate in the implementation of the program was selected. Subsequently, all children in this center were screened using the Achenbach Child Behavior Checklist (CBCL). Through this process, five children (four girls and one boy) who met the initial eligibility criteria were identified.

Afterward, the parents of these children were provided with detailed information regarding the purpose, rationale, and procedures of the intervention, and their questions were addressed. Diagnostic interviews based on the Diagnostic and Statistical Manual of Mental Disorders (5th ed. text rev.; APA, 2022) were then conducted with the selected children and their parents. However, the mother of one child (a boy) declined to participate in the sessions, and therefore he was excluded from the intervention. Another child (a girl) was also removed from the study due to being absent from more than two sessions. Ultimately, three girls remained as the main participants in the study sample.

Children were included in the study if they met the DSM-5 diagnostic criteria for behavioral problems, were within the preschool age range (5-6 years), and had a normal level of intelligence (as documented in their psychological records). In addition, their parents provided

both written and verbal informed consent to participate in the study. Conversely, children who, along with behavioral problems, also exhibited other disorders (such as mood or psychotic disorders), were taking psychiatric medication and/or receiving other psychological interventions, were absent for more than two sessions, or whose parents were unwilling to continue participating in the sessions were excluded from the study.

Measurement Tools

Achenbach Child Behavior Checklist (CBCL). This instrument was developed by Achenbach (1991) to assess externalizing behavior problems in children and was standardized in Iran by Minaee (2006). The preschool version of this checklist demonstrated a test–retest reliability coefficient of 0.85. Construct validity was reported as 0.94, and both content and criterion validity were also found to be satisfactory (Achenbach & Rescorla, 2000). In the study conducted by Yazdkhasti and Oreyzi (2011), Cronbach's alpha coefficients for the parent, teacher, and child forms were reported to be 0.90, 0.93, and 0.82, respectively, indicating high reliability. Construct validity was also evaluated as appropriate for this tool.

The checklist consists of two parts. The first part includes 13 items assessing the child's general competencies in activities, social interactions, and academic performance. The second part comprises 113 items that measure the child's emotional and behavioral problems. For data analysis, raw scores, percentile ranks, and T-scores are calculated. T-scores are determined based on the child's age and gender and identify borderline and clinical ranges. In the present study, this checklist was completed by the child's mother to assess externalizing behavior problems.

Shields and Cicchetti Emotion Regulation Checklist (ERC). This instrument, developed by Shields and Cicchetti (1997), consists of 24 items and includes two subscales: (1) Lability/Negativity, which assesses inflexibility, sudden mood changes, and disproportionate emotional reactions. a higher score on this subscale indicates greater mood instability and emotional reactivity; and (2) Emotion Regulation, which evaluates emotional management skills, including appropriateness of emotions to situations, empathy, and emotional self-awareness. a higher score reflects greater emotion regulation ability.

Items are rated on a 4-point Likert scale ranging from 1 (never) to 4 (always), with total scores ranging from 24 to 96. Cronbach's alpha coefficients indicate high internal consistency (0.96 for Lability/Negativity and 0.83 for Emotion Regulation). The subscales have shown negative correlations of −0.50 and −0.48, respectively, with the Aggression and Attention Problems subscales of the Teacher Form of the Achenbach Behavior Checklist, demonstrating acceptable discriminant validity. Moreover, the ERC's positive correlation (0.16) with the Peabody Picture Vocabulary Test supports its convergent validity. The Persian version of the checklist was standardized by Mahmoudi et al. (2016), with an overall reliability coefficient of 0.64, and its content validity was also reported as satisfactory. In the present study, the checklist was completed by the child's mother to assess the child's emotional self-regulation skills.

Procedure

In this study, an integrated emotional self-regulation program designed by the researcher was implemented. This intervention program was based on the transdiagnostic treatment approach and consisted of ten sessions divided into two sections; one for children and one for parents. Both groups received training related to cognitive and emotional self-regulation skills. In addition, the parent group received education on parenting and behavioral management skills. The content validity of the intervention program was evaluated by ten experts in the field of child mental health and emotional–behavioral disorders. Based on their judgments, the

Content Validity Ratio (CVR) of the intervention program was calculated as 0.98, indicating a high level of expert agreement regarding the necessity of the program content.

The parent sessions were conducted online, one day before the children's sessions, and lasted 45 to 60 minutes each. The sessions for children were held in person and lasted 20 to 30 minutes. The intervention program included structured session content, assignments, worksheets, and practical exercises. Worksheets and materials required for in-session activities were designed and prepared in advance. Furthermore, mothers were provided with supplementary exercises and assignments to be completed outside of the sessions. The main emphasis throughout the sessions was placed on the emotion of anger, frustration-inducing situations, and anger-triggering experiences. Details of the therapeutic session content are presented in Table 1.

Table1 Program Therapeutic Content

Session	Section	Content
1	**Child**	Familiarization with the structure and rules of therapy, introduction to emotions and their facial expressions, understanding the functions of emotions
	Parent	Familiarization with the structure of therapy, introduction to the three-component model of emotion, identification of emotional behaviors with emphasis on the anger cycle
	Joint	Practicing identification of emotions and their facial expressions
2	**Child**	Learning the three-component model of emotion, recognizing emotional behaviors, and learning to rate emotional intensity
	Parent	Learning emotion-focused parenting behaviors, introduction to the dual-tracking process (before, during, and after), opposite parenting behaviors: strategic attention
	Joint	Guiding parents in the use of strategic attention
3	**Child**	Learning opposite behaviors in response to emotional reactions; tracking emotions and behaviors
	Parent	Teaching opposite parenting behaviors, distress tolerance training, opposite parenting behaviors: adaptation and reward system
	Joint	Practicing distress tolerance and guiding parents in the use of reward systems
4	**Child**	Developing awareness of bodily cues, body scanning, and sensory exposure to bodily signals of anger and irritability
	Parent	Teaching bodily cues, body scanning skills, opposite parenting behaviors: expressing empathy
	Joint	Practicing body scanning and guiding parents in expressing empathy
5	**Child**	Teaching flexible thinking and identifying cognitive traps
	Parent	Teaching flexible thinking and cognitive traps, opposite parenting behaviors: effective commands
	Joint	Practicing identification of cognitive traps
6	**Child**	Teaching detective thinking
	Parent	Introducing detective thinking and cognitive flexibility, opposite parenting behaviors: effective disciplinary methods
	Joint	Practicing detective thinking
7	**Child**	Teaching and practicing problem-solving skills, identifying what can and cannot be controlled
	Parent	Introducing problem-solving skills, shaping and supporting problem-solving at home, opposite parenting behaviors: healthy autonomy support
	Joint	Practicing problem-solving and healthy autonomy support
8	**Child**	Teaching and practicing present-moment awareness, recognizing situational emotions
	Parent	Introducing present-moment awareness, opposite parenting behaviors: healthy emotional modeling
	Joint	Practicing present-moment awareness
9	**Child**	Teaching the logic and structure of exposure; practicing exposure to emotional situations
	Parent	Reviewing exposure principles and opposite parenting behaviors
	Joint	Practicing exposure exercises
10	**Child**	Reviewing learned skills, planning for coping with intense emotions in the future, reviewing treatment gains
	Parent	Reviewing learned skills, planning to support children in managing intense emotions
	Joint	Celebrating the child's progress

Before implementing the intervention, behavioral indicators and emotion regulation skills of the participants were measured using the Achenbach Child Behavior Checklist (Parent Form) and the Shields and Cicchetti Emotion Regulation Checklist during three separate baseline assessments. During the intervention phase, evaluations were conducted weekly and at the end of each session to monitor the child's behavioral and emotional progress. After the intervention, two follow-up assessments were carried out at one-month and three-month intervals to examine the stability of the effects.

Data were analyzed using a single-subject ABA design framework, meaning that data were evaluated across three stages; baseline, intervention, and follow-up. The results were reported through visual analysis and quantitative indices commonly used in single-subject research

Results

Table2 Demographic characteristics of participants

			Frequency	Percentage
Child	Gender	Girl	3	100
		Boy	0	0
		Total	3	100
	Age	5 years to 5 years and 6 months	2	66.6
		5 years and 6 months to 6 years	1	33.4
		Total	3	100
Parent	Gender	Female	3	100
		Male	0	0
		Total	3	100
	Age	20–30 years	0	0
		30–40 years	2	66.6
		40–50 years	1	33.4
		Total	3	100
	Education	Diploma	0	0
		Bachelor's degree	3	100
		Master's degree	0	0
		Total	3	100
	Employment status	Employed	2	66.6
		Housemaker	1	33.4
		Total	3	100

Based on the demographic data (see Table 2), all children who participated in the study were girls. In terms of age distribution, two children (66.6%) were in the age group of 5 to 5 years and 6 months, and one child (33.4%) was in the age group of 5 years and 6 months to 6 years. Their exact ages were 5 years and 2 months, 5 years and 3 months, and 5 years and 6 months, respectively. Among the parents, only mothers participated in the study, and no fathers were present. Regarding the mothers' age distribution, two participants (66.6%) were between 30 and 40 years old, and one participant (33.4%) was between 40 and 50 years old.

An examination of parents' educational levels showed that all of them held a bachelor's degree, indicating a uniform educational background within the sample. Concerning employment status, two mothers (66.6%) were employed, while one (33.4%) was a homemaker. These findings indicate that the sample group was homogeneous in terms of the children's

gender and parents' educational level, but there were slight variations in the mothers' age and employment status.

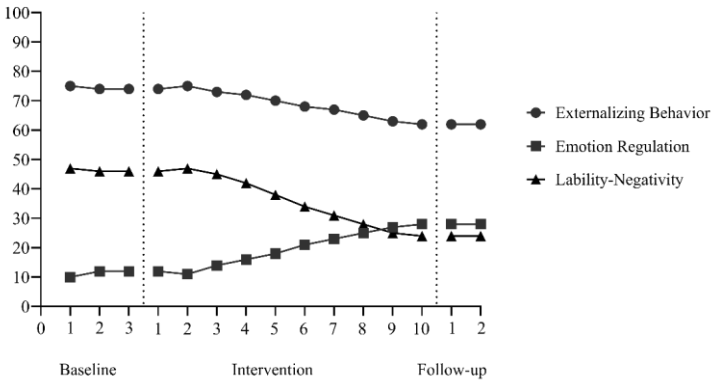

Figure1. Behavioral and Emotional Indicators Scores of Subject 1

An examination of the score trends for the first participant shows that the indices of externalizing behavior and lability/negativity demonstrated a decreasing trend throughout the implementation of the intervention program. In contrast, the emotion regulation index showed an increasing trend over the course of the sessions. During the follow-up stages, the values of these indices remained stable, showing no significant changes compared to the end of the intervention. This pattern is illustrated in Figure 1.

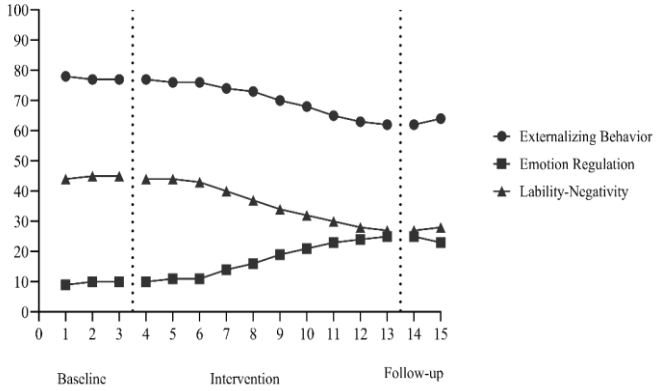

Figure2. Behavioral and Emotional Indicators Scores of Subject 2

According to the data presented in Figure 2, the externalizing behavior scores of the second participant show a decreasing but relatively moderate trend. Likewise, the lability/negativity index decreased during the intervention phase. The emotion regulation index also increased compared to the baseline phase. The changes observed during the follow-up phase were slight but remained stable.

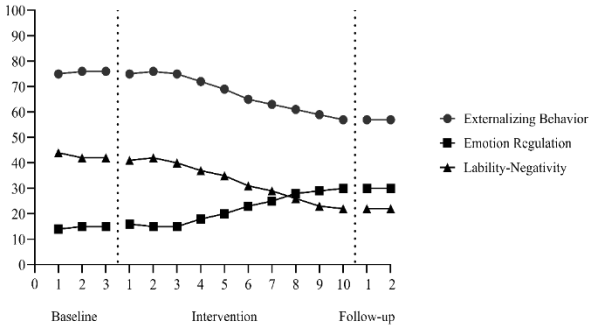

Figure3. Behavioral and Emotional Indicators Scores of Subject 3

An examination of the score trends for the third participant shows that the indices of externalizing behavior and lability/negativity decreased during the intervention period. In addition, the emotion regulation index demonstrated an increasing trend compared to the baseline phase. The changes recorded during the intervention phase were largely maintained at the same level in the follow-up period. These data are presented in Figure 3.

Table3 Visual analysis of inter-phase changes in the Achenbach Behavior Checklist

Step	Statistical indicators	Externalizing Behavior		
		Child1	Child2	Child3
Baseline	Number of Session	3	3	3
	Mean	74.33	77.33	75.67
	Middle	74	77	76
	Range	74-75	77-78	75-76
	Stability Envelope[a]	59.2-88.8	61.6-92.4	60.8-91.2
	Trend direction[b]	Descending	Descending	Ascending
	Relative level change[c]	-1	-1	1
	Absolute level change[d]	1-	1-	1
Intervention	Number of Session	10	10	10
	Mean	68.9	70.4	67.2
	Middle	69	71.5	67
	Range	62-75	62-77	57-76
	Stability Envelope	55.2-82.8	57.2-85.8	53.6-80.4
	Trend direction	Descending	Descending	Descending
	Relative level change	-8	-11	-14
	Absolute level change	12-	15-	18-
Follow-up	Number of Session	2	2	2
	Mean	62	63	57
	Middle	62	63	57
	Range	62-62	62-64	57-57
	Stability Envelope	49.6-74.4	50.4-75.6	45.6-68.4
	Relative level change	0	2	0
	Absolute level change	0	2	0
Baseline to Intervention	PND[e]	80%	90%	70%
	POD[f]	20%	10%	30%
	Relative level change	1-	1-	-1
	Absolute level change	0	0	-1
	Reliable change index[g]	21.4	26.85	32.79
	Improvement percentage	7.3%	8.9%	11.9%
	Cohen d	9.41	12.01	14.66

Note. a. Percentage of data points within ±25% of the median, reflecting phase stability
b. Overall slope of change (increasing, decreasing, or stable) across data points
c. Proportion of change from baseline to intervention relative to baseline level
d. Difference between the mean scores of two phases, showing the magnitude of behavioral change
e. (Percentage of Non-overlapping Data) Percentage of intervention data points that do not overlap with baseline; higher values indicate stronger effects
f. (Percentage of Overlapping Data) Percentage of overlapping points between phases; lower values reflect greater intervention impact
g. Indicates whether the observed change exceeds measurement error (|RCI| > 1.96 = significant)

Table 3 presents the visual and statistical indicators for the three participants across the baseline, intervention, and follow-up phases. In addition, data related to the between-phase analysis (baseline vs. intervention) are also reported. According to the ABA design, the scores of all three participants remained relatively stable during the baseline phase. However, with the beginning of the intervention phase, a consistent downward trend was observed in all participants. The mean scores of the participants decreased from 74.33, 77.33, and 75.67 in the baseline phase to 68.9, 70.4, and 67.2 in the intervention phase and further to 62, 63, and 57 in the follow-up phase.

Other indices confirmed this pattern. The relative level change during the intervention phase was −8, −11, and −14 for the three participants, all in the desired (decreasing) direction. The

absolute level change values were 12, 15, and 18, indicating a rapid reduction in scores immediately following the start of the intervention. The percentage of non-overlapping data (PND) was 80%, 90%, and 70%, showing that 70% to 90% of the intervention-phase data points fell outside the range of the baseline phase. In contrast, the percentage of overlapping data (POD) was low (10% to 30%), further supporting this finding.

The improvement percentage from baseline to the end of the intervention was calculated as 7.3%, 8.9%, and 11.9% for the three participants. The Cohen's d values ranged between 9.41 and 14.66, indicating a very large effect size. Similarly, the Reliable Change Index (RCI) values were 9.41, 12.01, and 14.66, all exceeding the critical value of ±1.96, suggesting that the observed changes were stable and clinically meaningful. The data trend in the follow-up phase remained stable or slightly declining, indicating the maintenance of therapeutic gains in the absence of ongoing sessions.

Overall, the general pattern of data and indices demonstrates that the emotional self-regulation program effectively led to a sustained reduction in externalizing behaviors among preschool children with behavioral disorders.

Table4 Visual analysis of inter-phase changes in the Shields and Cicchetti Emotion Regulation Checklist

Step	**Statistical indicators**	**Emotion Regulation**			**Lability/Negativity**		
		Subject1	Subject2	Subject3	Subject1	Subject2	Subject3
Baseline	Number of Session	3	3	3	3	3	3
	Mean	11.33	9.67	14.67	46.33	44.67	42.67
	Middle	12	10	15	46	45	42
	Range	10-12	9-10	14-15	46-47	44-45	42-44
	Stability Envelope[a]	9.6-14.4	8-12	12-18	36.8-55.2	36-54	33.6-50.4
	Trend direction[b]	Ascending	Ascending	Ascending	Descending	Ascending	Descending
	Relative level change[c]	2	1	1	-1	1	-2
	Absolute level change[d]	2	1	1	-1	1	2-
Intervention	Number of Session	10	10	10	10	10	10
	Mean	19.5	17.4	21/9	36	35/9	32/6
	Middle	19.5	17.5	21.5	36	35.5	33
	Range	11-28	10-25	15-30	24-47	27-44	22-42
	Stability Envelope	15.6-23.4	14-21	17.2-25.8	28.8-43.2	28.4-42.6	26.4-39.6
	Trend direction	Ascending	Ascending	Ascending	Descending	Descending	Descending
	Relative level change	11	12	13	-17	-13	-14
	Absolute level change	16	15	14	22-	17-	19-
Follow-up	Number of Session	2	2	2	2	2	2
	Mean	28	24	30	24	27.5	22
	Middle	28	24	30	24	27.5	22
	Range	28-28	23-25	30-30	24	27-28	22-22
	Stability Envelope	22.4-33.6	19.2-28.8	24-36	19.2-28.8	22-33	17.6-26.4
	Relative level change	0	-2	0	0	1	0
	Absolute level change	0	2-	0	0	-1	0
Baseline to Intervention	Absolute level change	0	0	1	0	-1	-1

	Relative level change	2	1	1	-1	-2	-2
	PND[e]	80%	90%	80%	80%	80%	90%
	POD[f]	20%	10%	20%	20%	20%	10%
	Reliable change index[g]	12.13	22.97	21.49	63.28	53.68	30.82
	Improvement percentage	72.1%	79.93%	49.28%	22.29%	19.63%	23.59%
	Cohen d	7.07	13.39	12.53	17.9	15.18	8.72

Note. a. Percentage of data points within ±25% of the median, reflecting phase stability
b. Overall slope of change (increasing, decreasing, or stable) across data points
c. Proportion of change from baseline to intervention relative to baseline level
d. Difference between the mean scores of two phases, showing the magnitude of behavioral change
e. (Percentage of Non-overlapping Data) Percentage of intervention data points that do not overlap with baseline; higher values indicate stronger effects
f. (Percentage of Overlapping Data) Percentage of overlapping points between phases; lower values reflect greater intervention impact
g. Indicates whether the observed change exceeds measurement error (|RCI| > 1.96 = significant)

The data from the Shields and Cicchetti Emotion Regulation Checklist are presented in Table 4. According to the ABA design, in the Emotion Regulation subscale, the mean scores for the participants during the baseline phase were 11.33, 9.67, and 14.67, respectively. With the onset of the intervention, the mean scores increased to 19.5, 17.4, and 21.9, and in the follow-up phase, they further increased to 28, 24, and 30. The data trend for all three participants was upward and stable, indicating a gradual and consistent improvement in emotion regulation ability.

In the Lability/Negativity subscale, the baseline mean scores for the participants were 46.33, 44.67, and 42.67, which decreased to 36, 35.9, and 32.6 during the intervention phase and to 24, 27.5, and 22 during the follow-up phase. The data trend in this subscale was consistently downward, reflecting a reduction in emotional instability and negativity.

Analysis of the quantitative indices revealed that the relative level change during the intervention phase in the Emotion Regulation subscale was +12, +12, and +11, while in the Lability/Negativity subscale it was −17, −13, and −14. The absolute level change for Emotion Regulation was −16, −15, and −14, and for Lability/Negativity it was 22, 17, and 19—all changes were in the desired direction. The Reliable Change Index (RCI) for the change from baseline to intervention was 12.13, 22.97, and 21.49 for Emotion Regulation and 63.28, 53.68, and 30.82 for Lability/Negativity, all exceeding the critical value of ±1.96, indicating stable and clinically significant changes.

The percentage of non-overlapping data (PND) for both subscales ranged between 80% and 90%, while the percentage of overlapping data (POD) ranged between 10% and 20%. The treatment improvement percentage for Lability/Negativity was 22.29%, 19.63%, and 23.59%, and for Emotion Regulation it was 72.1%, 79.93%, and 49.28%. The Cohen's d effect size was 17.9, 15.18, and 8.72 for Lability/Negativity and 7.07, 13.39, and 12.53 for Emotion Regulation, representing very large effect sizes across both subscales.

Overall, the data indicate that the integrated cognitive and emotional self-regulation program led to a sustained improvement in emotion regulation skills and a reduction in emotional instability and negativity among preschool children. Furthermore, these positive effects were maintained during the follow-up phase, confirming the stability of the treatment outcomes.

Discussion and Conclusion

The present study was conducted to examine the effectiveness of an integrated cognitive and emotional self-regulation program based on transdiagnostic treatment in reducing externalizing behavior problems among preschool children with behavioral disorders. The findings of this

single-subject study indicated that implementing this program can positively influence the improvement of emotional regulation and the reduction of behavioral problems in preschool children.

The results of the present research confirmed the fundamental role of emotional self-regulation in externalizing behavior problems, which is consistent with the findings of Fernandes et al. (2023). Similarly, in line with the studies of Grossman and Ehrenreich-May (2020) and Kakolaki et al. (2024), it was found that teaching emotional self-regulation strategies based on transdiagnostic treatment can reduce externalizing behaviors such as anger and irritability in children. Integrating parent training in behavioral management and parenting skills alongside emotional self-regulation training for children may enhance the overall effectiveness of behavioral interventions. A similar outcome was reported by Pham et al. (2024), who also observed the beneficial impact of parental involvement on child behavior outcomes.

The use of a transdiagnostic treatment approach which, rather than focusing on superficial symptoms, targets shared underlying mechanisms across disorders by teaching emotion regulation, cognitive flexibility, and exposure to negative emotions, resulted in deep and lasting changes in the study participants. Specifically, concurrent with a notable reduction in anxiety and an improvement in social interactions, behavioral problems also decreased significantly. Additionally, the active participation of the mothers in therapy sessions and their consistent practice of the learned skills at home were key factors contributing to the maintenance and generalization of the therapeutic effects.

Based on the findings of this study, the mechanism of therapeutic change can be interpreted as follows: the skills taught through this program reduce automatic behavioral responses and enhance the child's capacity for self-regulation, thereby increasing frustration tolerance. Consequently, the child learns to attend to emotions, use alternative interpretations, and consider available solutions in order to select more adaptive responses in challenging situations.

Therefore, the reduction in externalizing behavior problems cannot be solely attributed to decreased emotional intensity but may also result from the development of cognitive processing skills and the use of strategies such as flexible thinking, identifying cognitive traps, and problem-solving. These skills enable children to reinterpret emotional situations and respond in less aggressive and more adaptive ways. In this regard, Hosokawa et al. (2024) also emphasized the role of mechanisms such as cognitive restructuring and problem-solving in reducing externalizing behavior problems. They demonstrated that training children to identify and challenge negative or maladaptive thoughts and replace them with more adaptive strategies leads to improved emotion regulation and reduced impulsive reactions.

It is noteworthy that the findings of this study provide preliminary evidence for the program's effectiveness; however, as a proof-of-concept study, further research with broader samples is needed. The homogeneity of participants in terms of gender and mothers' education limits the generalizability of results to boys or children from different socio-economic backgrounds. Additionally, since only participating mothers completed the questionnaires, response biases such as social desirability or expectancy effects may have occurred. Future

studies are encouraged to include more diverse samples and use multiple information sources (e.g., teacher reports or independent observations) to improve data accuracy and validity.

Therefore, the results of this study should be interpreted with consideration of its limitations. The intervention was conducted in a preschool setting, where certain contextual factors such as staff movements, concurrent activities, and the presence of other children, sometimes disrupted the focus and order of the sessions. Additionally, only mothers participated in the treatment, while the role of fathers in family interactions and behavioral reinforcement was not examined. Moreover, the study utilized a single-subject design with only three child participants, which limits the generalizability of the findings to other children or age groups. Broader studies with larger samples are needed for more robust conclusions.

Considering these limitations, several suggestions are proposed for future research. Involving both parents in the therapeutic process could increase the intervention's effectiveness and more comprehensively modify family maladaptive reinforcement cycles. Conducting the sessions in a suitable and controlled environment could minimize potential distractions and enhance session quality. Also, due to the limited generalizability of the results, implementing this program using controlled experimental designs, larger sample sizes, and long-term follow-ups could provide more accurate evidence of the program's effectiveness. Finally, although this study focused on externalizing behavior problems, examining both internalizing and externalizing symptoms in future research could offer a more comprehensive understanding of the program's effectiveness.

In conclusion, this study demonstrated that implementing a cognitive and emotional self-regulation intervention based on transdiagnostic treatment among preschool-aged children can effectively reduce externalizing behavior problems, enhance emotional self-regulation abilities, and improve relationships between the child, parents, and peers. These findings may serve as a foundation for developing early, targeted interventions for young children with emotional and behavioral difficulties, thereby contributing to the prevention of persistent disorders in later developmental stages

Declarations

Author Contributions

All authors equally contributed to the conception, design, data collection, analysis, and writing of this research.

Data Availability Statement

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

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Ethical considerations

All procedures of this study were conducted in accordance with the ethical principles outlined in international research guidelines. Informed consent was obtained from the parents of all participants, and confidentiality of their information was maintained throughout all stages of

the research. This study was approved by the Research Ethics Committee of the University of Tehran under the code IR.UT.PSYEDU.REC.1403.075 on August, 2024.

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Conflict of interest

The authors declare that there were no conflicts of interest in conducting this research.

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