KMAN PUBLISHING INSTITUTE
Journal Website

Article history:
Received 29 July 2025
Revised 15 January 2026
Accepted 22 January 2026
Initial Published 24 January 2026
Final Publication 10 July 2026

Journal of Adolescent and Youth Psychological Studies

Volume 7, Issue 3, pp 1-12

E-ISSN: 2981-2526

Comparison of the Effectiveness of Emotion Regulation Training and Self-Differentiation Training on Behavioral Problems of Tenth-Grade Female Students in Baghbahadoran

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A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Khorsandi, M., Ghazanfari, A., & Ghasemi Pirbalouti, M. (2026). Comparison of the Effectiveness of Emotion Regulation Training and Self-Differentiation Training on Behavioral Problems of Tenth-Grade Female Students in Baghbahadoran. *Journal of Adolescent and Youth Psychological Studies, 7*(3), 1-12.
http://dx.doi.org/10.61838/kman.jayps.4944

A B S T R A C T

Objective: The objective of this study was to compare the effectiveness of emotion regulation training and self-differentiation training on reducing internalizing and externalizing behavioral problems among tenth-grade female students.

Methods and Materials: This study adopted a quantitative, applied, quasi-experimental design with pretest, posttest, and a three-month follow-up, including two experimental groups and one control group. The statistical population consisted of tenth-grade female students in Baghbahadoran during the 2023–2024 academic year, from which 81 students were initially selected through cluster random sampling and convenience sampling. Participants were randomly assigned to an emotion regulation training group, a self-differentiation training group, or a control group. The emotion regulation intervention was implemented using the ten-session "Think Cool, Act Cool" program, while self-differentiation training was delivered based on Bowen's theory in ten structured sessions. Behavioral problems were assessed at three time points using the Achenbach Youth Self-Report questionnaire. Data were analyzed using repeated measures analysis of variance and mixed analysis of variance in SPSS version 27.

Findings: The results indicated a significant main effect of time for both internalizing and externalizing behavioral problems, demonstrating substantial reductions from pretest to posttest that were maintained at follow-up. Significant group differences were observed, with both intervention groups showing significantly lower levels of internalizing and externalizing problems compared to the control group. No statistically significant differences were found between the emotion regulation and self-differentiation training groups. Effect sizes were large for both outcome variables, indicating strong intervention effects.

Conclusion: Both emotion regulation training and self-differentiation training were equally effective in reducing internalizing and externalizing behavioral problems in adolescent girls, and the beneficial effects remained stable over time. These findings support the use of either intervention as an effective school-based approach for improving adolescents' emotional and behavioral adjustment.

Keywords: *Emotion Regulation Training; Self-Differentiation; Internalizing Problems; Externalizing Problems; Adolescent Girls*

1. Introduction

Adolescence represents a critical developmental period characterized by rapid biological maturation, cognitive restructuring, emotional intensification, and expanding social demands. These transitions render adolescents particularly vulnerable to a wide spectrum of emotional and behavioral difficulties, which often manifest as internalizing and externalizing behavioral problems. Internalizing problems typically include symptoms such as anxiety, depression, withdrawal, and somatic complaints, whereas externalizing problems encompass aggressive behavior, delinquency, impulsivity, and rule-breaking conduct. Large-scale epidemiological and longitudinal studies indicate that both categories of problems are highly prevalent during adolescence and frequently co-occur, exerting long-term negative effects on psychological well-being, academic achievement, interpersonal functioning, and mental health trajectories into adulthood (Arslan et al., 2021; Babicka-Wirkus et al., 2023; Keyes & Platt, 2024).

Contemporary developmental psychopathology frameworks emphasize that adolescence is not merely a period of symptom escalation, but rather a sensitive window in which underlying self-regulatory capacities are still maturing. Neurodevelopmental research has shown that ongoing structural and functional changes in the prefrontal cortex, limbic system, and social brain networks significantly influence adolescents' ability to regulate emotions, impulses, and social behavior (Andrews et al., 2021; Silvers, 2022). During this stage, emotional reactivity often increases more rapidly than regulatory control, leading to heightened vulnerability to dysregulated emotional responses and maladaptive behavioral patterns (Stoykova, 2024; Young et al., 2019). As a result, difficulties in emotion regulation have been increasingly conceptualized as a central transdiagnostic mechanism underlying both internalizing and externalizing behavioral problems in youth (Cavanagh et al., 2014; Kraft et al., 2023; Polack et al., 2021).

Emotion regulation refers to the processes through which individuals monitor, evaluate, and modify the intensity, duration, and expression of emotional experiences in order to achieve personal and social goals. Developmental and clinical research consistently demonstrates that deficits in emotion regulation are strongly associated with depressive symptoms, anxiety disorders, aggression, substance use, risky behaviors, and academic underachievement in adolescents (Gonçalves et al., 2019; Kulkarni et al., 2021; Singh & Singh, 2023). Meta-analytic evidence further indicates that maladaptive emotion regulation strategies, such as rumination, suppression, and impulsive behavioral discharge, significantly predict the persistence and escalation of behavioral problems over time (Fu et al., 2020; Gruhn & Compas, 2020; Safaei, 2021).

Importantly, emotion regulation is not a unitary construct but comprises both cognitive and behavioral components. Cognitive strategies involve processes such as reappraisal, attentional deployment, and cognitive distancing, whereas behavioral strategies include actions such as distraction, relaxation, problem-solving, and behavioral inhibition. Research suggests that adolescents with predominantly internalizing problems tend to rely more heavily on maladaptive cognitive strategies, whereas those with externalizing problems often exhibit deficits in behavioral regulation and impulse control (Mohammadzadeh, 2017; Nook et al., 2020; Schwartz-Mette et al., 2021). This differentiation underscores the necessity of intervention models that integrate both cognitive and behavioral emotion regulation strategies to effectively address the full spectrum of adolescent behavioral problems (Eadeh et al., 2021; Te Brinke et al., 2018).

Over the past decade, emotion regulation training programs have gained increasing empirical support as effective psychosocial interventions for adolescents. Systematic reviews and meta-analyses indicate that structured emotion regulation interventions can significantly reduce internalizing symptoms, aggressive behavior, emotional outbursts, and risk-taking behaviors while simultaneously enhancing social functioning and academic engagement (Eadeh et al., 2021; Gómez-León, 2025; Mehraban & Alivandivafa, 2022). Both group-based and school-based formats have been shown to be feasible and effective, particularly when interventions are developmentally tailored and incorporate experiential learning, homework practice, and real-life application (Carroll et al., 2021; Dixius et al., 2023; Salehi Esfahani, 2024).

One such developmentally adapted intervention is the "Think Cool, Act Cool" program, which explicitly integrates cognitive and behavioral emotion regulation strategies within a structured, adolescent-friendly framework. This program is grounded in the distinction between cognitive ("Think Cool") and behavioral ("Act Cool") regulation pathways and has been specifically designed to target externalizing behavior problems while remaining applicable to internalizing difficulties (Te Brinke et al., 2018). By

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incorporating emotion awareness, physiological monitoring, cognitive restructuring, behavioral problem-solving, and self-regulation chains, this approach aligns closely with contemporary transdiagnostic models of emotion dysregulation (Helland et al., 2023; Renna, 2021). Empirical evidence suggests that such integrative emotion regulation training can lead to sustained reductions in both internalizing and externalizing behavioral symptoms during adolescence (López-Martínez et al., 2025; Najafi Chaleshtori et al., 2021; Ravanbakhsh, 2018).

Despite the robust evidence supporting emotion regulation training, there is growing recognition that emotional and behavioral problems in adolescence are also deeply embedded within relational and family systems. From a systemic perspective, adolescents' emotional reactivity and behavioral difficulties cannot be fully understood without considering patterns of emotional interdependence, attachment, and differentiation within the family context. Bowen's Family Systems Theory offers a comprehensive framework for understanding these dynamics, with differentiation of self identified as a core construct underlying emotional functioning across generations (Calatrava et al., 2022; Józefczyk, 2023).

Differentiation of self refers to an individual's capacity to maintain emotional autonomy while remaining meaningfully connected to significant others. Low differentiation is characterized by emotional fusion, heightened reactivity, difficulty separating thoughts from feelings, and excessive dependence on interpersonal approval, all of which increase vulnerability to anxiety, aggression, and maladaptive coping behaviors (Murdock et al., 2022; Peleg & Messerschmidt-Grandi, 2019). In contrast, higher levels of self-differentiation are associated with greater emotional stability, adaptive emotion regulation, effective interpersonal boundaries, and reduced psychological distress (Dolz-del-Castellar & Oliver, 2021; Yavuz Güler & Karaca, 2021).

Research conducted with adolescents and young adults demonstrates that poor self-differentiation is significantly associated with internalizing symptoms such as anxiety and depression, as well as externalizing behaviors including interpersonal conflict, emotional outbursts, and impulsivity (Hemmati, 2017; Murdock et al., 2022). Moreover, multigenerational transmission studies suggest that patterns of emotional reactivity and low differentiation are often passed across generations, reinforcing maladaptive behavioral responses under stress (Calatrava et al., 2022; Józefczyk, 2023). These findings highlight the potential value of self-differentiation training as an intervention target for adolescent behavioral problems.

Self-differentiation training programs derived from Bowen's theory typically focus on increasing emotional awareness, distinguishing thoughts from feelings, improving emotional expression, modifying dysfunctional relational roles, and reducing emotional fusion in close relationships. Empirical studies indicate that such interventions can lead to significant improvements in emotional regulation, anxiety reduction, interpersonal functioning, and psychological well-being (Dolz-del-Castellar & Oliver, 2021; Mohammadi & Alibakhshi, 2021). However, most existing studies have focused on adults or couples, with comparatively limited research examining the effectiveness of self-differentiation training among adolescents, particularly within school-based or preventive contexts.

In parallel, cultural and contextual factors further underscore the need for comparative intervention research. Adolescents in educational settings face increasing academic pressures, peer stressors, and social media influences that exacerbate emotional dysregulation and behavioral difficulties (De Neve et al., 2023; Wartberg et al., 2021; Zhang & Qian, 2024). School-based interventions that can be feasibly implemented within the academic calendar and that address both individual emotional skills and relational functioning are therefore of critical importance. Moreover, gender-specific research suggests that adolescent girls may be particularly susceptible to internalizing problems and emotion regulation difficulties, making targeted interventions especially relevant for this population (Keyes & Platt, 2024; Sanchis-Sanchis et al., 2020).

Despite the growing body of research on emotion regulation and self-differentiation as separate intervention targets, there is a notable gap in the literature regarding their direct comparison within a single empirical framework. Few studies have examined whether emotion regulation training and self-differentiation training yield differential or comparable effects on internalizing and externalizing behavioral problems in adolescents. Addressing this gap is essential for informing evidence-based intervention selection in school and clinical settings, optimizing resource allocation, and refining theoretical models of adolescent emotional and behavioral development.

Accordingly, the present study seeks to compare the effectiveness of emotion regulation training based on the "Think Cool, Act Cool" program and self-differentiation training based on Bowen's theory in reducing internalizing

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E-ISSN: 2981-2526

and externalizing behavioral problems among tenth-grade female students in Baghbahadoran.

The aim of this study was to compare the effectiveness of emotion regulation training and self-differentiation training on internalizing and externalizing behavioral problems in tenth-grade female students.

2. Methods and Materials

2.1. Study Design and Participants

The present study employed a quantitative, applied, quasi-experimental design with pretest, posttest, and a three-month follow-up, incorporating two experimental groups and one control group. The experimental conditions consisted of an emotion regulation training program and a self-differentiation training program grounded in Bowen's family systems theory, alongside a no-intervention control group. Following approval from the General Directorate of Education of Isfahan Province, formal coordination was undertaken with the Education Department of Baghbahadoran City and the administrative staff of local secondary schools. From the statistical population of approximately 400 tenth-grade female students enrolled during the 2023–2024 academic year, one girls' high school was selected using cluster random sampling. Within this school, three tenth-grade classes were selected by convenience sampling. A total of 81 students met the inclusion criteria, which included voluntary participation, provision of written informed consent, and the absence of diagnosed psychological disorders or current use of psychiatric medications, as assessed through a brief structured clinical interview and initial screening questions. Eligible participants were randomly assigned to the emotion regulation training group, the self-differentiation training group, or the control group. During an initial briefing session, participants were informed about the study objectives, the voluntary nature of participation, the right to withdraw at any time, confidentiality of responses, the non-harmful nature of the procedures, and access to study results upon request. The pretest assessment was conducted in December 2023 prior to first-semester examinations. The intervention phase began in January 2024, immediately after the examinations, at a time when students had received their first formal academic feedback at the secondary level. The emotion regulation intervention was delivered using the "Think Cool, Act Cool" program developed by te Brink (2018), while the self-differentiation intervention followed the structured training package proposed by Mohammadi et al. (2021). Each intervention consisted of ten consecutive weekly sessions, each lasting 75 minutes, and included structured homework assignments. The posttest assessment was administered in late March 2024 before the Nowruz holidays, and the follow-up assessment was conducted in June 2024 prior to second-semester examinations. Throughout the study, exclusion criteria included initiation of psychiatric medication, receipt of concurrent psychological or social-work services, emergence of physical conditions requiring immediate intervention, absence from more than three training sessions, or voluntary withdrawal. After applying these criteria, data from 74 participants across the three groups were retained for final analysis.

2.2. Measures

Data were collected using the Achenbach Adolescent Behavioral Problems Questionnaire, Youth Self-Report form, which was standardized in Iran by Kakabraei (2007). This self-report instrument is designed for adolescents aged 11 to 18 years with at least a fifth-grade education and can be completed in approximately 15 minutes. The questionnaire comprises a competencies and activities section and a syndromes section. The syndromes section includes 112 items rated on a three-point Likert scale and assesses eight primary domains: withdrawal, somatic complaints, depression/anxiety, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior, in addition to a category of other behavioral problems capturing heterogeneous difficulties such as disobedience and appetite disturbances. Composite indices are derived, including internalized problems, calculated from the withdrawal, somatic complaints, and depression/anxiety scales, and externalized problems, derived from delinquent and aggressive behavior scales. A total behavioral problems score is obtained by summing all problem-related items, with higher scores indicating greater severity of behavioral difficulties. Psychometric evaluations of the Iranian version have demonstrated excellent reliability, with Cronbach's alpha coefficients reported at 0.97 and test–retest reliability at 0.94. Evidence for content, criterion, and construct validity has been reported as satisfactory, supporting the instrument's suitability for assessing emotional and behavioral problems in adolescent populations.

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2.3. *Interventions*

The emotion regulation intervention was implemented using the ten-session "Think Cool, Act Cool" program, selected due to its developmental appropriateness for adolescents and its integrated focus on both cognitive and behavioral regulation strategies, thereby addressing internalizing and externalizing behavioral problems simultaneously. The program began with an introductory session aimed at building rapport, clarifying training objectives, and helping participants identify personal goals related to anger and emotional control. Across subsequent sessions, participants were systematically trained to recognize emotional triggers through the use of an anger thermometer based on situations, bodily sensations, behaviors, and cognitions. The intervention followed two parallel but integrated pathways: the Act Cool module, which emphasized behavioral strategies such as engaging in enjoyable activities, deep breathing, time-out, and behavioral problem-solving skills including setting boundaries and seeking help; and the Think Cool module, which focused on cognitive strategies such as cognitive distraction, self-talk, cognitive reappraisal, perspective-taking, and cognitive problem-solving. Each session included a structured review of homework assignments, guided practice of new regulation strategies, and preparation of new at-home exercises to promote generalization of skills. In the later sessions, participants practiced applying the full Think Cool and Act Cool regulation chains to emotionally challenging situations, consolidating skills learned throughout the program and enhancing their ability to flexibly regulate emotions across different contexts.

Self-differentiation training was conducted using the ten-session package developed by Mohammadi and colleagues, grounded in Bowen's family systems theory and adapted for unmarried adolescent participants by replacing marital concepts with friendship-based relationships. The program began with an orientation session focused on group cohesion, clarification of goals and rules, and increasing participants' awareness of self-differentiation and its relevance to interpersonal functioning. Early sessions emphasized understanding emotional fusion and separation within the family of origin, distinguishing between one's own thoughts and feelings and those of others, and recognizing the role of rational versus non-rational beliefs. Subsequent sessions focused on subjective interpretation of experiences, value formation, and healthy emotional expression, including role-playing exercises to practice expressing previously suppressed feelings and responding constructively to others' emotions. Mid-program sessions addressed attachment styles, multigenerational transmission patterns, family emotional systems, triangles, and genogram construction to increase insight into transgenerational influences on current relationships. Later sessions targeted maladaptive family roles, incorrect relational patterns, defense mechanisms, and intrapersonal conflicts, with an emphasis on increasing self-awareness and autonomy while maintaining emotional connection. The final session focused on integration and consolidation of learning, reflection on personal changes, and receiving feedback, with the overall goal of enhancing emotional autonomy, reducing reactivity in relationships, and improving behavioral adjustment in social and peer contexts.

2.4. *Data Analysis*

Following data collection, responses were coded and entered into SPSS version 27 for statistical analysis. Given that participants in each group were assessed at three time points—pretest, posttest, and follow-up—a repeated measures analytical framework was adopted. To simultaneously examine within-group changes over time and between-group differences while minimizing inflation of measurement error associated with multiple covariance analyses, a mixed analysis of variance design with within-subject and between-subject factors was applied.

3. Findings and Results

Table 1 presents the means and standard deviations of internalizing and externalizing behavioral problems across the emotion regulation training group, the self-differentiation training group, and the control group at the pretest, posttest, and follow-up stages.

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Table 1

Means and Standard Deviations of Behavioral Problem Components in the Experimental and Control Groups at Pretest, Posttest, and Follow-Up

Behavioral Components	Group	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD	Follow-Up Mean	Follow-Up SD
Internalizing Problems	Emotion Regulation	49.15	5.08	37.25	5.15	37.71	5.38
	Self-Differentiation	48.77	6.08	37.62	6.28	38.48	6.36
	Control Group	51.33	5.31	52.73	5.53	52.26	5.67
Externalizing Problems	Emotion Regulation	13.75	2.86	5.16	3.44	4.56	4.07
	Self-Differentiation	14.59	4.25	6.07	4.27	6.00	4.29
	Control Group	14.80	2.90	14.67	2.96	14.67	2.96

As shown in Table 1, the mean scores of internalizing problems in both experimental groups were comparable at the pretest stage, with means of 49.15 (SD = 5.08) for the emotion regulation group and 48.77 (SD = 6.08) for the self-differentiation group, while the control group showed a slightly higher mean of 51.33 (SD = 5.31). Following the interventions, substantial reductions were observed in the posttest means of internalizing problems in the emotion regulation group (M = 37.25, SD = 5.15) and the self-differentiation group (M = 37.62, SD = 6.28), and these reductions were largely maintained at follow-up (M = 37.71, SD = 5.38 and M = 38.48, SD = 6.36, respectively). In contrast, the control group exhibited relatively stable internalizing problem scores across posttest (M = 52.73, SD = 5.53) and follow-up (M = 52.26, SD = 5.67). A similar pattern was observed for externalizing problems. At pretest, the emotion regulation group (M = 13.75, SD = 2.86), the self-differentiation group (M = 14.59, SD = 4.25), and the control group (M = 14.80, SD = 2.90) demonstrated comparable levels of externalizing problems. At posttest, marked decreases were evident in the emotion regulation group (M = 5.16, SD = 3.44) and the self-differentiation group (M = 6.07, SD = 4.27), with these lower levels persisting at follow-up (M = 4.56, SD = 4.07 and M = 6.00, SD = 4.29, respectively). In contrast, the control group showed minimal change across posttest and follow-up (both M = 14.67, SD = 2.96), indicating that improvements in behavioral problems were specific to the intervention conditions and remained relatively stable over time.

Prior to conducting the main inferential analyses, the statistical assumptions underlying repeated measures analysis of variance and multivariate analysis of covariance were examined. The normality of the distribution of internalizing and externalizing behavioral problem scores at each measurement stage was assessed using skewness and kurtosis indices as well as the Shapiro–Wilk test, all of which indicated acceptable deviations from normality. The assumption of homogeneity of variances across groups was evaluated using Levene's test, which yielded non-significant results, supporting equality of error variances. Sphericity was examined using Mauchly's test; given violations of sphericity, the Greenhouse–Geisser correction was applied to adjust the degrees of freedom in the repeated measures analyses. For the covariance analyses, the linearity between the covariate (pretest scores) and dependent variables was confirmed, and the homogeneity of regression slopes across groups was verified through non-significant interaction effects between group membership and the covariate. Additionally, the absence of multicollinearity was ensured by examining correlation coefficients and tolerance values, which fell within acceptable ranges. Collectively, these results indicated that the assumptions required for the selected statistical procedures were adequately met, allowing for valid interpretation of the findings.

Table 2

Greenhouse–Geisser Corrected Tests for Internalizing and Externalizing Behavioral Problems

Variable	Source of Variance	Sum of Squares	df	Mean Square	F	Significance Level	Eta Squared
Internalizing Behavioral Problems	Greenhouse–Geisser Correction	1243.9	3.50	345.5	82.5	0.0001	0.699
Externalizing Behavioral Problems	Greenhouse–Geisser Correction	594.1	3.63	163.5	23.4	0.0001	0.398

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As shown in Table 2, the Greenhouse–Geisser corrected repeated-measures analysis revealed a statistically significant effect of time on both internalizing and externalizing behavioral problems. For internalizing problems, the effect was substantial, with an F value of 82.5 and a significance level of 0.0001, indicating marked changes across the measurement stages. The associated eta squared value of 0.699 suggests a large effect size, reflecting considerable variance explained by time. Similarly, externalizing behavioral problems demonstrated a significant time effect, with an F value of 23.4 and a significance level of 0.0001. The eta squared value of 0.398 indicates a moderate to large effect size, confirming meaningful changes in externalizing behaviors across pretest, posttest, and follow-up assessments.

Table 3

Post Hoc Pairwise Comparisons of Behavioral Problem Components Across Time

Scale	Stage A	Stage B	Mean Difference (A–B)	Standard Error	Significance Level
Internalizing Behavioral Problems	Pretest	Posttest	7.21	0.355	0.0001
	Posttest	Follow-Up	0.285	0.268	0.873
Externalizing Behavioral Problems	Pretest	Posttest	5.74	0.399	0.0001
	Posttest	Follow-Up	0.223	0.399	1.000

Table 3 presents the results of pairwise comparisons across the three measurement stages. For internalizing behavioral problems, a significant reduction was observed from pretest to posttest, with a mean difference of 7.21 and a significance level of 0.0001. However, the comparison between posttest and follow-up was not statistically significant, as indicated by a mean difference of 0.285 and a significance level of 0.873, suggesting stability of treatment effects over time. A similar pattern was found for externalizing behavioral problems, where a significant decrease occurred from pretest to posttest with a mean difference of 5.74 ($p = 0.0001$). The absence of a significant difference between posttest and follow-up (mean difference = 0.223, $p = 1.000$) indicates that the reductions in externalizing behaviors were maintained during the follow-up period.

Table 4

Analysis of Covariance for Differences Between Experimental and Control Groups

Variable	Statistic	Value	Hypothesis df	Error df	F	Significance Level	Eta Coefficient	Test Power
Internalizing Behavioral Problems	Wilks' Lambda	0.139	2	70	216.9	0.0001	0.861	1.00
Externalizing Behavioral Problems	Wilks' Lambda	0.243	2	70	109.2	0.0001	0.757	1.00

As shown in Table 4, the multivariate analysis of covariance demonstrated statistically significant differences between the experimental and control groups for both internalizing and externalizing behavioral problems after controlling for pretest scores. For internalizing problems, Wilks' Lambda was 0.139, with an F value of 216.9 and a significance level of 0.0001, indicating a very strong group effect. The eta coefficient of 0.861 reflects a large effect size, and the test power of 1.00 confirms the robustness of this finding. Similarly, for externalizing behavioral problems, Wilks' Lambda was 0.243, with an F value of 109.2 and a significance level of 0.0001. The eta coefficient of 0.757 indicates a large effect size, and full statistical power further supports the reliability of the observed group differences.

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Table 5

Post Hoc Pairwise Comparisons of Intervention Effects on Behavioral Problem Components

Scale	Intervention A	Intervention B	Mean Difference	Standard Error	Significance Level
Internalizing Behavioral Problems	Emotion Regulation	Self-Differentiation	0.255	1.42	1.000
	Emotion Regulation	Control Group	10.73	1.70	0.0001
	Self-Differentiation	Control Group	10.48	1.75	0.0001
Externalizing Behavioral Problems	Emotion Regulation	Self-Differentiation	1.07	0.807	0.572
	Emotion Regulation	Control Group	6.89	0.966	0.0001
	Self-Differentiation	Control Group	5.82	0.994	0.0001

Table 5 shows the results of pairwise comparisons examining differences between intervention groups. For internalizing behavioral problems, no statistically significant difference was found between the emotion regulation and self-differentiation training groups, as indicated by a mean difference of 0.255 and a significance level of 1.000. In contrast, both experimental groups differed significantly from the control group, with mean differences of 10.73 for emotion regulation training and 10.48 for self-differentiation training ($p = 0.0001$), demonstrating the effectiveness of both interventions. A similar pattern was observed for externalizing behavioral problems, where the difference between the two experimental interventions was not statistically significant (mean difference = 1.07, $p = 0.572$). However, both the emotion regulation and self-differentiation groups showed significantly lower externalizing problem scores compared to the control group, with mean differences of 6.89 and 5.82, respectively ($p = 0.0001$), confirming that both interventions were effective in reducing externalizing behavioral problems relative to no treatment.

4. Discussion

The findings of the present study demonstrated that both emotion regulation training based on the "Think Cool, Act Cool" program and self-differentiation training grounded in Bowen's family systems theory led to significant reductions in internalizing and externalizing behavioral problems among tenth-grade female students, and that these effects were maintained at the three-month follow-up. The repeated-measures analyses indicated a strong effect of time for both internalizing and externalizing problems, reflecting meaningful changes from pretest to posttest that remained stable over time. In contrast, the control group showed no significant changes across the same period, underscoring that the observed improvements were attributable to the interventions rather than to maturation or contextual factors. Furthermore, multivariate covariance analyses revealed large effect sizes for group differences, confirming that participation in either intervention was associated with substantially lower levels of behavioral problems compared to the control condition. Notably, post hoc comparisons indicated no statistically significant differences between the two intervention groups, suggesting that emotion regulation training and self-differentiation training were comparably effective in reducing both domains of behavioral problems.

The effectiveness of emotion regulation training in reducing internalizing problems observed in this study is consistent with a substantial body of literature identifying emotion dysregulation as a core mechanism underlying anxiety, depression, withdrawal, and somatic complaints in adolescence. Developmental research emphasizes that adolescence is a sensitive period for the maturation of emotion regulation capacities, during which heightened emotional reactivity often exceeds regulatory control (Silvers, 2022; Young et al., 2019). Empirical studies have consistently shown that difficulties in cognitive emotion regulation strategies, such as rumination and maladaptive appraisal, predict the onset and persistence of internalizing symptoms (Gonçalves et al., 2019; Polack et al., 2021). Meta-analytic evidence further supports the efficacy of structured emotion regulation interventions in reducing internalizing symptoms among adolescents by enhancing awareness of emotions, cognitive reappraisal, and adaptive coping skills (Eadeh et al., 2021; Kraft et al., 2023). The present findings align with these conclusions and extend them by demonstrating that an integrative program combining cognitive and behavioral strategies can produce stable improvements over time.

Similarly, the marked reduction in externalizing behavioral problems following emotion regulation training supports theoretical models that conceptualize externalizing disorders as disorders of emotional regulation rather than solely as behavioral or conduct problems (Carlson et al., 2023; Cavanagh et al., 2014). Externalizing behaviors such as aggression and delinquency are often driven by deficits in

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impulse control, emotional awareness, and behavioral inhibition, particularly under conditions of heightened emotional arousal. The "Think Cool, Act Cool" program explicitly targets these mechanisms by teaching adolescents to recognize physiological and cognitive cues of escalating emotions and to apply both cognitive and behavioral regulation strategies in real-life situations (Te Brinke et al., 2018). Previous intervention studies have demonstrated that emotion regulation training can significantly reduce aggressive behavior, disciplinary problems, and risky behaviors in adolescent samples (Mehraban & Alivandivafa, 2022; Ravanbakhsh, 2018; Salehi Esfahani, 2024). The current results corroborate these findings and suggest that emotion regulation training is effective not only for internalizing difficulties but also for externalizing problems in school-aged girls.

The observed effectiveness of self-differentiation training in reducing internalizing behavioral problems is also theoretically and empirically grounded. Bowen's family systems theory posits that low differentiation of self is associated with heightened emotional reactivity, difficulty separating thoughts from feelings, and increased vulnerability to anxiety and depressive symptoms (Calatrava et al., 2022; Murdock et al., 2022). Adolescents with low self-differentiation may experience intense emotional fusion with significant others, leading to maladaptive coping responses and internalized distress. Empirical studies have consistently demonstrated negative associations between self-differentiation and anxiety, rumination, and emotion regulation difficulties (Dolz-del-Castellar & Oliver, 2021; Peleg & Messerschmidt-Grandi, 2019; Yavuz Güler & Karaca, 2021). By fostering emotional autonomy, reflective functioning, and healthier expression of emotions, self-differentiation training may reduce internalizing symptoms through improved emotional clarity and reduced reactivity. The present findings are consistent with previous research showing that interventions based on Bowen's theory can improve emotional functioning and psychological well-being (Hemmati, 2017; Mohammadi & Alibakhshi, 2021).

The reduction in externalizing behavioral problems following self-differentiation training further supports systemic and relational explanations of adolescent behavior. Externalizing behaviors often emerge in contexts of emotional fusion, poorly defined interpersonal boundaries, and unresolved family roles, which can manifest as impulsive reactions, conflictual interactions, and oppositional behavior (Józefczyk, 2023; Murdock et al., 2022). Training adolescents to differentiate their emotional experiences from those of others, to tolerate interpersonal stress without reactive behavior, and to clarify personal values and roles may reduce the likelihood of behavioral outbursts and rule-breaking behaviors. Prior studies have reported associations between higher differentiation of self and lower levels of aggression and maladaptive interpersonal behavior (Dolz-del-Castellar & Oliver, 2021; Peleg & Messerschmidt-Grandi, 2019). The present results extend this literature by demonstrating that a structured self-differentiation training program can effectively reduce externalizing problems in a school-based adolescent sample.

One of the most salient findings of the study is the absence of significant differences between the emotion regulation and self-differentiation training groups in their effects on both internalizing and externalizing behavioral problems. This equivalence suggests that although the two interventions are grounded in different theoretical frameworks, they may converge on shared underlying mechanisms. Emotion regulation training directly targets intrapersonal regulatory processes, while self-differentiation training emphasizes relational and systemic emotional functioning. However, both approaches aim to enhance emotional awareness, reduce reactivity, and promote more adaptive responses to emotional and interpersonal stressors. Contemporary developmental models increasingly emphasize the interdependence of individual self-regulation capacities and relational contexts in shaping adolescent behavior (De Neve et al., 2023; Menzel et al., 2023). From this perspective, improvements in self-differentiation may indirectly enhance emotion regulation capacities, while emotion regulation training may facilitate greater emotional autonomy and relational stability.

The maintenance of treatment effects at follow-up further underscores the clinical and educational relevance of both interventions. Sustained reductions in behavioral problems suggest that participants were able to generalize and retain the skills acquired during the training sessions. Previous longitudinal research indicates that emotion regulation skills acquired during adolescence can have lasting protective effects against psychopathology and maladaptive behaviors (Gonçalves et al., 2019; Lennarz et al., 2019). Similarly, improvements in self-differentiation are theorized to have enduring effects due to their grounding in core patterns of emotional functioning and relational engagement (Calatrava et al., 2022; Józefczyk, 2023). The present findings provide empirical support for the long-term utility of both approaches in reducing behavioral problems among adolescent girls.

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5. Conclusion

Taken together, the results of this study contribute to the growing evidence base supporting both emotion regulation training and self-differentiation training as effective interventions for adolescent behavioral problems. By directly comparing these two theoretically distinct yet conceptually overlapping approaches within a single empirical framework, the study offers valuable insights for researchers, clinicians, and educators seeking to select and implement evidence-based interventions in school settings. The findings suggest that both approaches can be considered viable options for addressing internalizing and externalizing behavioral problems in adolescent girls, with the choice of intervention potentially guided by contextual factors, available resources, and specific intervention goals rather than by expectations of differential effectiveness.

6. Limitations & Suggestions

The limitations of this study include the use of a quasi-experimental design rather than a fully randomized controlled trial, which may limit causal inference. The sample was restricted to tenth-grade female students from a single city, reducing the generalizability of the findings to other age groups, male adolescents, or different cultural and educational contexts. In addition, reliance on self-report measures may have introduced response bias, and the follow-up period, while informative, was relatively short.

Future research should examine the comparative and combined effects of emotion regulation and self-differentiation training in more diverse and larger samples, including male adolescents and different educational levels. Longitudinal studies with extended follow-up periods are needed to assess the durability of intervention effects over time. Future studies may also explore potential mediators and moderators, such as baseline emotion regulation capacity, family functioning, or peer relationships, to better understand for whom and under what conditions each intervention is most effective.

From a practical perspective, the findings suggest that both emotion regulation training and self-differentiation training can be effectively implemented in school settings as preventive or early intervention programs. School counselors and psychologists may select either approach based on institutional resources, training availability, and students' specific needs. Integrating elements of both approaches into comprehensive mental health programs may further enhance their effectiveness and contribute to the promotion of emotional well-being and behavioral adjustment among adolescents.

Acknowledgments

We would like to express our appreciation and gratitude to all those who cooperated in carrying out 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.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

Authors' Contributions

M.K. contributed to the conceptualization of the study, development of the research objectives, and design of the intervention framework. A.G. supervised the methodological procedures, provided expert guidance on emotion regulation and self-differentiation theories, and reviewed the analytical strategy. M.G.P. was responsible for data collection, implementation of the training programs, statistical analyses, and preparation of the results section. All authors jointly participated in the interpretation of findings, manuscript drafting and revision, and approved the final version of the manuscript. All authors take full responsibility for the accuracy, integrity, and scientific rigor of the work.

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