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Comparative Effectiveness of Schema Therapy and Dialectical Behavior Therapy on Body Mass Index in Women with Obesity

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Abstract

Objective: This study aimed to compare the effectiveness of Schema Therapy and Dialectical Behavior Therapy (DBT) on Body Mass Index (BMI) in individuals with obesity.

Materials and Methods: A quasi-experimental controlled study with a pretest–posttest design and a four-month follow-up was conducted among 45 women with obesity. Samples were selected through convenience sampling and randomly assigned to two intervention groups (ST and DBT) and one control group (15 participants per group). The intervention groups received 12 weekly 90-minute sessions based on standardized treatment protocols, while the control group received no intervention. BMI was calculated as weight (kg) divided by height squared (m^2). Data were analyzed using repeated-measures ANOVA and post hoc comparisons.

Results: The findings indicated that both ST and DBT significantly reduced BMI scores from pretest to posttest ($P< 0.001$) and these reductions were maintained at the four-month follow-up ($P< 0.001$). The interaction effect of time × group was also significant ($F= 37.50$, $P< 0.001$), indicating that the pattern of BMI change differed across groups. However, post hoc comparisons demonstrated no significant difference between the effectiveness of ST and DBT in reducing BMI. Both interventions performed similarly and were superior to the control group.

Conclusion: Both ST and DBT were effective in reducing BMI in individuals with obesity and their effects were maintained over time. However, no significant difference was observed between the two therapeutic approaches in terms of effectiveness.

Keywords: Schema therapy, Dialectical behavior therapy, Obesity, Body mass index

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Introduction

Obesity has emerged as one of the most critical global public health challenges of the twenty first century. It is widely recognized as a multifactorial condition resulting from dynamic interactions among biological, environmental, behavioral, and psychological determinants (1,2). In addition to its well documented medical complications, including cardiovascular disease, type 2 diabetes, metabolic syndrome and reduced quality of life (3). Obesity is strongly associated with emotional dysregulation, psychological distress, maladaptive eating patterns and body image dissatisfaction (4-6). Increasingly, these psychological correlates are understood not merely as consequences of obesity but as central mechanisms that contribute to its onset, maintenance and relapse (7).

Although lifestyle-based interventions such as dietary modification, physical activity enhancement and behavioral prescriptions can facilitate modest short term weight reduction, long term maintenance remains a major clinical challenge (8,9). Frequent relapse and weight regain highlight the insufficiency of traditional behavioral approaches in addressing the deeper cognitive emotional processes underlying overeating. Accordingly, contemporary obesity models emphasize the importance of targeting maladaptive schemas, regulatory deficits, coping vulnerabilities and emotional eating tendencies to achieve sustainable weight regulation (10,11).

ST offers a theoretically grounded framework for addressing these persistent psychological drivers. According to schema theory, early maladaptive schemas formed through adverse developmental experiences shape enduring patterns of cognition, affect, and coping. Activation of these schemas may increase vulnerability to emotional eating, binge eating, avoidance behaviors, and self-regulatory deficits in individuals with obesity(12,13). Empirical findings further suggest that schema focused interventions can improve emotional regulation, reduce maladaptive eating patterns and enhance overall psychological functioning among individuals with obesity and binge eating pathology(14,15).

DBT, based on the biosocial model of emotional dysregulation, provides another evidence supported approach for addressing maladaptive eating and impulsive behaviors. DBT conceptualizes overeating and binge eating tendencies as maladaptive attempts to regulate intense affect in individuals with insufficient emotional regulation capacities (16). Structured DBT programs emphasizing mindfulness, distress tolerance, emotion regulation and interpersonal effectiveness have demonstrated promising results in reducing binge eating, improving eating related self-control and supporting behavioral weight management efforts (17-19).

Despite accumulating evidence supporting the utility of both ST and DBT in treating obesity related psychological difficulties, direct comparative studies remain limited. Most prior research has evaluated these interventions independently, providing little insight into their relative effectiveness in improving weight related outcomes such as (BMI)(9,20). This gap is clinically important because ST and DBT target distinct psychological mechanisms—schema modification versus emotion regulation enhancement—which may differentially influence eating behaviors, treatment engagement and long-term weight control (10,12).

Clarifying the comparative impact of these two intervention models may guide the development of more targeted and mechanism based psychological treatments for obesity. Therefore, the present study aims to directly compare the effectiveness of ST and DBT on BMI among individuals with obesity, thereby contributing to an improved understanding of psychologically integrated weight management interventions.

Material and methods

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Study design

This study employed a quasi-experimental design with a pretest–posttest control group and a four-month follow-up. Two experimental groups and one control group were compared and the study variables were measured at three time points: pretest, posttest, and follow-up.

Participants and sampling

Participants per group: 45 participants (15 per group) ,The statistical population consisted of all women with obesity living in Tehran in 2025. The sample was drawn from eligible individuals who were willing to participate in the study. The sample was drawn from eligible individuals who were willing to participate in the study. The required sample size was determined using G*Power software (version 3.1) for a repeated-measures ANOVA design (within-between interaction: 3 groups and 3 measurement points). With alpha set at 0.05, statistical power at 0.80 and assuming a large effect size (f= 0.52) consistent with structured psychotherapy trials, a minimum sample size of 45 participants (15 per group) was determined. To account for potential attrition during the intervention process, 87 individuals were initially recruited through convenience sampling. After applying the inclusion and exclusion criteria and considering dropouts during the treatment sessions, a total of 45 participants (15 in each group) remained and were included in the final analyses. Furthermore, a post-hoc sensitivity analysis using the observed effect size (partial eta squared= 0.641, f= 1.34) confirmed that the statistical power achieved by this sample size exceeded 0.99, confirming sufficient statistical power to detect the interaction effect. To account for potential attrition during the intervention process, 87 individuals were initially recruited through convenience sampling. After applying the inclusion and exclusion criteria and considering dropouts during the treatment sessions, a total of 45 participants (15 in each group) remained and were included in the final analyses. Participants were then randomly assigned to two experimental groups (ST and DBT) and one control group.

In this study, a set of inclusion criteria was defined to ensure that the participants were clinically and demographically appropriate for the research objectives. First, BMI≥ 30 kg/m² was required, consistent with the World Health Organization (WHO) classification of obesity. This threshold was chosen because the primary focus of the study was to examine the effectiveness of psychological interventions on BMI among individuals with obesity. Second, participants were required to be between 20 and 45 years of age. This age range was selected to reduce potential confounding effects of wide age variability on psychological and metabolic variables and to ensure a relatively homogeneous sample in terms of developmental stage and lifestyle characteristics. Third, participants had to have at least a high school diploma. This educational requirement was intended to ensure that individuals were able to understand the therapeutic concepts, follow session content and accurately complete self-report questionnaires used in the study, thereby facilitating meaningful participation in ST and DBT sessions. Finally, provision of written informed consent was mandatory. In line with ethical principles for research involving human participants, individuals were included only if they voluntarily agreed to participate after receiving clear information about the aims, procedures, potential benefits and possible risks of the study.

To ensure the absence of major comorbid psychiatric disorders, the structured clinical interview for DSM-5 (SCID-5) was administered, covering the main modules for mood, anxiety, obsessive–compulsive and other major clinical disorders. Individuals with uncontrolled chronic or acute medical conditions (e.g., severe thyroid dysfunction, advanced cardiovascular disease) that could directly affect body weight or physical activity level were excluded. Concurrent receipt of any psychological, psychiatric, nutritional, or complementary intervention during the study period, or within two months before study

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entry, also constituted an exclusion criterion. During the course of the study, the following were considered criteria for withdrawal: absence from more than two treatment sessions, unwillingness to continue participation, pregnancy, or intention to become pregnant.

Procedure

After obtaining the necessary ethical approvals and institutional permissions, potential participants were thoroughly briefed on the study aims and procedures and written informed consent was obtained. The consent documentation explicitly underscored the voluntary nature of participation, the unconditional right to withdraw from the investigation at any stage without prejudice, the strict maintenance of data confidentiality, and the ethical safeguarding of participants' welfare. Following the verification of eligibility criteria and completion of the consent process, baseline assessments were administered (pretest, T1). In the present study, Body Mass Index (BMI) served as the primary clinical outcome and standard diagnostic metric for obesity, calculated objectively as weight in kilograms divided by the square of height in meters (kg/m2\text{kg/m}^2kg/m2).

Participants were subsequently allocated to one of three arms: a Schema Therapy (ST) group, a Dialectical Behavior Therapy (DBT) group, or a waitlist control group. The two active intervention groups received structured group-based psychotherapeutic programs, whereas the control group received no psychological intervention during the active study timeframe.

The ST intervention protocol was developed based on the conceptual framework of Young et al. (21) and adapted for obesity-related maladaptive eating behaviors. The program comprised 12 weekly group sessions, each lasting 90 minutes. Structurally, the intervention progressed through distinct, sequential therapeutic phases (detailed in Table 1). Initial sessions focused on psychoeducation regarding core emotional needs and schema conceptualization, enabling participants to identify their dominant Early Maladaptive Schemas (EMSs) and map their functional links to dysfunctional eating patterns. The intermediate phase utilized cognitive restructuring alongside potent experiential interventions—primarily imagery rescripting and experiential chairwork (e.g., empty-chair and mode dialogues)—to facilitate corrective emotional processing and defuse schema triggers. Limited reparenting was maintained as the foundational relational stance throughout the therapeutic process.

The behavioral dimension targeted behavioral pattern-breaking, assertiveness skills and the substitution of surrender/avoidance/overcompensation modes with adaptive coping repertoires. Concluding sessions emphasized the consolidation of treatment gains, reinforcement of the Healthy Adult mode and structured relapse prevention protocols. To mitigate extraneous confounding variance in weight trajectories, participants were instructed to maintain their habitual dietary regimens, baseline physical activity levels, and stable pharmacotherapy regimens throughout the entire intervention phase.

The DBT intervention was structured according to Linehan's foundational skills training framework (22), tailored to target emotion-driven dysregulation in obesity. Paralleling the ST condition, DBT was delivered across 12 weekly 90-minute group sessions, systematically targeting four primary modules: mindfulness, distress tolerance, emotion regulation and interpersonal effectiveness (an outline of session contents is summarized in Table 2). Didactic and experiential components encompassed the attainment of "wise mind," sensory grounding, self-soothing practices, identification and alignment with values, restructuring of maladaptive self-talk and non-judgmental acceptance. Specific emphasis was placed on emotion modulation and the execution of "opposite action" strategies to inhibit maladaptive eating impulses during moments of acute negative affect. The concluding phase was dedicated to integrative synthesis,

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overlearning of skills and troubleshooting long-term behavioral maintenance.

Ethical considerations were observed regarding the control group by offering an identical brief psychoeducational intervention following the conclusion of all data collection phases. Outcome assessments across all three experimental arms were executed at three designated intervals: baseline (T1), immediate post-intervention (T2, following session 12) and a 4-month follow-up (T3) to ascertain both the immediate efficacy and longitudinal maintenance of treatment outcomes.

Data analysis

Data were analyzed at both descriptive and inferential levels. Descriptive statistics, including means and standard deviations, were used to summarize the characteristics of the participants and study variables. Prior to conducting inferential analyses, the assumptions of repeated measures ANOVA were examined. The normality of the data distribution was assessed using the Shapiro–Wilk test and the results indicated that the assumption of normality was satisfied (P> 0.05). Homogeneity of variances across groups was evaluated using Levene's test, which confirmed that the variances were equal across groups (P> 0.05).

The assumption of sphericity was examined using Mauchly's test. The results indicated that the assumption of sphericity was violated (Mauchly's W= 0.349, $\chi^2(2)$= 43.125, P< 0.001). Therefore, the Greenhouse–Geisser correction was applied (ε= 0.606). Subsequently, repeated measures analysis of variance (ANOVA) was conducted to examine the effects of time, group and the interaction between time and group on BMI. All analyses were performed using SPSS version 26, with the significance level set at α= 0.05.

BMI

BMI was calculated for each participant as weight in kilograms divided by the square of height in meters (kg/m²). Participants with a BMI≥ 30 were classified as having obesity and were eligible for inclusion in the study.

Ethical considerations

Ethical approval was obtained from the Ethics Committee of Islamic Azad University, Central Tehran Branch (approval code: IR.IAU.CTB.REC.1405.013).

Results

Baseline demographic characteristics and pre-intervention scores across the three groups were compared prior to testing the main hypotheses. The mean age of participants was 36.40 (± 4.12) years in the ST group, 5.80 (± 3.85) years in the DBT group and 37.10 (± 4.45) years in the control group, demonstrating no statistically significant baseline differences among the groups (P= 0.412). Similarly, marital status (P= 0.812) and educational level (P= 0.694) did not differ significantly across groups at baseline. Regarding the primary outcome variable at pretest, baseline BMI was comparable across the ST 32.27 (± 1.62), DBT 31.60 (± 1.45) and control 31.47 (± 2.67) groups (P= 0.328), confirming baseline equivalence across the study arms.As presented in Table 3, mean BMI values were comparable across the three groups at baseline. Following the intervention, participants in both the ST and DBT groups exhibited marked reductions in BMI, whereas values in the control group remained relatively unchanged.

Mauchly's test of sphericity indicated that the assumption of sphericity was violated for the within-subjects factor (W= 0.349, $\chi^2(2)$= 43.125, P< 0.001); therefore, the Greenhouse–Geisser correction was applied (ε= 0.606). Repeated-measures ANOVA revealed a significant main effect of time on BMI, F(1.29, 34.30)= 78.10, P= 0.001, η^2= 0.650, indicating significant variation in BMI across measurement intervals.

The main effect of group was also significant, F(2, 40)= 4.13, P= 0.023, η^2= 0.164. Crucially, the time × group interaction effect was statistically significant, F(2.59, 51.80)= 37.50, P= 0.001, η^2= 0.641, confirming that the pattern and magnitude of BMI changes across time differed significantly as a function of group assignment.

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Table 1. ST protocol

Session	Objective	Session Content	Homework
1	Introduce schema therapy	Group rules, schemas, coping styles, modes	Write treatment goals
2	Increase schema awareness	Identify schema triggers	Record two triggering situations
3	Strengthen self-monitoring	Identify recurring patterns and modes	Record one situation with active mode
4	Identify emotional roots of schemas	Early experiences and imagery	Record distressing situation
5	Deepen emotional awareness	Unmet emotional needs and vulnerable child	Record emotional needs
6	Modify schema messages	Cognitive restructuring from Healthy Adult perspective	Write healthy responses
7	Imagery rescripting	Corrective emotional experience	Record healthy adult response
8	Strengthen healthy adult mode	Apply corrective experiences	Record real-life example
9	Modify punitive parent mode	Schema dialogue	Record critical messages
10	Behavioral pattern breaking	Identify maladaptive patterns	Plan behavioral change
11	Consolidate changes	Maintenance planning	Complete maintenance plan
12	Treatment summary	Review strategies and posttest	—

Table 2. ST Protocol

Session	Objective	Session Content	Homework
1	Introduce schema therapy	Group rules, schemas, coping styles, modes	Write treatment goals
2	Increase schema awareness	Identify schema triggers	Record two triggering situations
3	Strengthen self-monitoring	Identify recurring patterns and modes	Record one situation with active mode
4	Identify emotional roots of schemas	Early experiences and imagery	Record distressing situation
5	Deepen emotional awareness	Unmet emotional needs and vulnerable child	Record emotional needs
6	Modify schema messages	Cognitive restructuring from Healthy Adult perspective	Write healthy responses
7	Imagery rescripting	Corrective emotional experience	Record healthy adult response
8	Strengthen healthy adult mode	Apply corrective experiences	Record real-life example
9	Modify punitive parent mode	Schema dialogue	Record critical messages
10	Behavioral pattern breaking	Identify maladaptive patterns	Plan behavioral change
11	Consolidate changes	Maintenance planning	Complete maintenance plan
12	Treatment summary	Review strategies and posttest	—

Table 2. Demographic and BMI Characteristics of Participants across Study Groups

Variable / Stage	ST (n= 15) Mean(±SD)	DBT (n= 15) Mean(±SD)	Control Group (n= 15) Mean(±SD)	*P*-value
Age (Years)	36.40 (± 4.12)	35.80 (± 3.85)	37.10 (± 4.45)	0.412
BMI (Pretest)	32.27 (± 1.62)	31.60 (± 1.45)	31.47 (± 2.67)	0.328
BMI (Posttest)	29.93 (± 1.44)	29.67 (± 1.54)	31.33 (± 2.94)	< 0.001*
BMI (Follow-up)	30.20 (± 1.37)	29.73 (± 1.39)	31.47 (± 3.00)	< 0.001*

ST: Schema Therapy; DBT: Dialectical Behavior Therapy. Repeated measures ANOVA showed a significant time×group interaction (F= 37.50, *P*= 0.001, η^2= 0.641). * *P*< 0.001.

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Bonferroni-adjusted pairwise comparisons revealed significant reductions in BMI from pretest to posttest ($P< 0.001$) and from pretest to follow-up ($P< 0.001$). The difference between posttest and follow-up was not statistically significant ($P= 0.055$), demonstrating that the therapeutic gains were maintained over the four-month follow-up. Regarding between-group comparisons at posttest, both ST and DBT achieved significantly greater BMI reductions compared with the control condition ($P< 0.001$ for both). However, no significant difference was observed between ST and DBT ($P= 0.780$), indicating comparable intervention efficacy.

Discussion

The present study aimed to compare the effectiveness of ST and DBT on BMI among women with obesity. The findings indicated that both interventions led to a reduction in BMI from pretest to posttest, and these improvements were generally maintained during the follow-up phase. The significant interaction between time and group suggests that the observed changes were related to the psychological interventions rather than the mere passage of time.

Obesity is widely recognized as a complex and multifactorial condition influenced by biological, behavioral and psychological factors (1-3). Recent research has increasingly emphasized the role of psychological mechanisms such as emotional regulation difficulties, maladaptive eating behaviors and body-related cognitions in the development and maintenance of obesity (2,5,7). In particular, emotional eating has been identified as a significant barrier to successful weight management, especially among women with obesity (6).

The findings of the present study are consistent with previous research indicating that psychological and behavioral interventions can contribute to improvements in weight-related outcomes (8,9,23). Such interventions may influence eating patterns, self-regulation and emotional coping strategies, which are important determinants of weight control and long-term obesity management.

The effectiveness of ST observed in this study may be explained by its focus on early maladaptive schemas and dysfunctional coping modes. According to schema theory, maladaptive schemas formed during early life experiences can influence emotional responses and behavioral patterns throughout adulthood (21,24). Research suggests that these schemas may contribute to maladaptive eating behaviors and difficulties in emotion regulation (10,12,25). When schemas related to rejection, emotional deprivation, or defectiveness are activated, individuals may engage in overeating or emotional eating as a coping mechanism. ST aims to modify these deep-seated cognitive-emotional patterns and promote healthier coping strategies, which may explain the reductions in BMI observed in the ST group (14,15).

Similarly, the positive effects of DBT can be interpreted through its emphasis on emotion regulation, distress tolerance and mindfulness skills. DBT proposes that maladaptive behaviors often arise from difficulties in regulating intense emotional states (22-25). In the context of obesity, eating may function as a strategy for managing distress or negative affect. By teaching individuals' skills for emotional awareness, impulse control and distress tolerance, DBT may reduce emotional eating and improve behavioral regulation related to food intake. Previous studies have also demonstrated the usefulness of DBT-based interventions in reducing binge eating and improving eating-related self-control (16-18).

Interestingly, the results of the present study showed no significant difference between ST and DBT in their effects on BMI. This finding suggests that although the two approaches are theoretically distinct, they may influence weight-related outcomes through partially overlapping psychological mechanisms. Both interventions target emotional processes, maladaptive coping strategies and behavioral regulation, which are central factors in problematic eating behaviors (5,7,10).

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Therefore, improvements in emotional regulation and adaptive coping may represent a common pathway through which different psychological interventions contribute to weight management.

Overall, the findings highlight the importance of addressing psychological factors in obesity treatment programs. While traditional interventions often focus primarily on dietary modification and physical activity, growing evidence suggests that integrating psychological approaches may enhance treatment effectiveness and support more sustainable weight management outcomes (3,8,20)

This study has several limitations that should be considered when interpreting the findings. First, BMI was used as the sole outcome variable, which represents a relatively crude anthropometric indicator. Although BMI is widely used in obesity research, it does not capture the complex psychological and behavioral processes associated with overeating, weight fluctuations, or treatment responsiveness. Future studies should consider incorporating additional outcome measures such as emotional eating, binge eating behaviors, emotion regulation difficulties and eating-related self-control, which may provide a more comprehensive understanding of the mechanisms through which ST and DBT influence weight-related outcomes.

Second, the sample consisted exclusively of women, which limits the generalizability of the findings to men or more diverse populations. Gender differences in emotional regulation, coping styles and eating patterns are well documented; therefore, future research should purposively include male participants or examine gender as a moderating variable. Third, although random assignment to groups was performed, the use of convenience sampling may introduce selection bias and limit external validity. Additionally, the relatively small sample size, despite being sufficient for statistical power, may have reduced the sensitivity for detecting subtle between-group differences.

Fourth, the follow-up period was limited to four months. Although both treatments demonstrated sustained effects, longer follow-up periods (e.g., 6–12 months) are necessary to evaluate the long-term maintenance of change, particularly given the chronic and relapsing nature of obesity.

Finally, participants were instructed not to alter dietary or physical activity routines; however, adherence to these instructions could not be fully controlled. Unmeasured lifestyle changes may have influenced BMI outcomes to some extent.

Future studies are recommended to use larger and more diverse samples, random sampling methods and longer follow-up periods to enhance the generalizability and durability of findings. In addition to BMI, future research should include multidimensional psychological, behavioral, metabolic, and physiological outcomes, such as emotional eating, binge eating, emotion regulation, body fat percentage, and waist-to-hip ratio. Mechanism-focused and mixed-methods designs are also suggested to clarify how ST and DBT produce change in individuals with obesity.

Conclusion

The present study compared the effects of ST and DBT on BMI among individuals with obesity. Both therapeutic approaches resulted in significant reductions in BMI from pretest to posttest and these improvements were maintained at the four-month follow-up. Although both interventions were superior to the control condition, no significant difference was found between ST and DBT, suggesting that both treatments offer comparable therapeutic benefits in weight-related outcomes.

However, the reliance on BMI as the sole outcome variable underscores the need for future research to incorporate more nuanced psychological and behavioral indicators. Considering the multifactorial nature of obesity, integrating multidimensional assessments may contribute to a more precise

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understanding of how psychological interventions influence weight regulation.

Overall, the findings support the clinical utility of ST and DBT as effective, mechanism-informed approaches for individuals with obesity, offering promising pathways for developing integrative psychological treatment models.

Declaration of generative ai and ai-assisted technologies in the writing process

During the preparation of this manuscript, the authors utilized OpenAI's ChatGPT/GPT-based language models solely to enhance language readability, check grammatical accuracy and format tables in accordance with academic reporting standards. After using this tool, the authors thoroughly reviewed, verified and edited the content and assume full responsibility for the scientific integrity, authenticity, and accuracy of the data and conclusions presented in the publication.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Authors' contributions

R.SH.S, L.L: writing- original draft and analyzing data. R.SH.S, L.L. supervision and conceptualization, R.SH.S, L.L; M.S.M.: collecting the data and Conceptualization, M.S.M.: Supervision and methodological contributions. All the authors critically revised the manuscript, agree to be fully accountable for the integrity and accuracy of the study and read and approved the final manuscript.

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