

The Efficacy of Cognitive Behavioral Therapy (CBT) in Obesity Management: Assessing Psychological and Behavioral Outcomes in Two Case Studies

Khedidja Daamache

University of Laghouat (Algeria)

kh.daamache@lagh-univ.dz

<https://orcid.org/0009-0005-2926-3503>***Ibrahim Bouzidani***

Istanbul University: Istanbul/Turkey

Ibrahim.bouzidani@istanbul.edu.tr

<https://orcid.org/0000-0003-3585-9352>**Abstract:**

This study investigated the efficacy of a cognitive-behavioral therapy (CBT) intervention in managing obesity by assessing its impact on psychological indicators and dietary behaviors. Using a single-case experimental A-B design, the research focused on two participants—a 32-year-old female and a 28-year-old male—exhibiting obesity alongside comorbid psychological distress. The intervention, which spanned eight weeks of sessions centered on cognitive restructuring and stimulus control, was evaluated using the Beck Depression Inventory (BDI-II), the Eating Attitudes Test (EAT-26), and the Body Image Questionnaire (BIQ). Visual analysis and effect size calculations indicated significant and stable clinical improvements in both cases. Specifically, results showed a substantial reduction in emotional eating and depressive symptoms, paired with a marked increase in body image satisfaction. With a Percentage of Non-overlapping Data (PND) reaching 100%, the findings underscore the high efficacy of the program. The study concludes that CBT is a pivotal tool in obesity management, facilitating not only weight regulation but also psychological equilibrium and the long-term sustainability of behavioral change.

Keywords: Obesity, Cognitive Behavioral Therapy (CBT), Body Image, Emotional Eating, Single-Case Design.

Introduction

In contemporary medical literature, obesity is classified as a complex chronic disease characterized by excessive fat accumulation that leads to severe health impairments (World Health Organization [WHO], 2024). Obesity is no longer a phenomenon confined to developed nations; it has evolved into a "global pandemic" threatening the sustainability of healthcare systems in both developing and developed societies. Recent statistics indicate that the number of individuals living with obesity has surpassed one billion worldwide (NCD Risk Factor Collaboration [NCD-RisC], 2024).

The gravity of this phenomenon lies in its rapid temporal acceleration. Analytical studies published in *The Lancet* confirm that obesity rates among adults have doubled since 1990, while a fourfold increase was recorded among children and adolescents (aged 5–19) during the same period (NCD-RisC,

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2024). From a prospective standpoint, the *World Obesity Atlas* predicts that more than 51% of the global population will suffer from overweight or obesity by 2035, exerting unprecedented pressure on healthcare infrastructure (World Obesity Federation, 2024).

Clinically, research has established that obesity is a primary driver of non-communicable diseases (NCDs), showing strong correlations with type 2 diabetes, coronary heart disease, and strokes (ScienceDirect, 2024). Furthermore, the International Agency for Research on Cancer (IARC) has identified a robust causal link between high Body Mass Index (BMI) and an increased risk of 13 types of cancer, rendering obesity the second leading cause of preventable cancer after smoking (IARC, 2024).

The repercussions of obesity extend beyond physiological aspects to encompass profound economic and social dimensions. The global economic impact resulting from obesity-related consequences is estimated at \$4.32 trillion annually by 2035, equivalent to 2.9% of the global GDP (World Obesity Federation, 2024). This interplay between genetic factors and the "obesogenic environment" necessitates the adoption of comprehensive policy approaches that transcend individual awareness toward structural changes in food and social systems.

In addition to physiological consequences, obesity imposes a severe psychological burden, manifesting in a complex reciprocal relationship with mental disorders. Clinical studies (e.g., American Psychological Association [APA], 2024) emphasize that individuals with obesity are 55% more likely to develop clinical depression compared to their counterparts. This burden extends beyond depression to include anxiety disorders, diminished self-esteem, and body image disturbances, which are exacerbated by "weight stigma" and discrimination in educational and professional settings (Rubino et al., 2020). Such psychological pressures often lead to a vicious cycle known as "emotional eating," where food is utilized as a defense mechanism to cope with stress, thereby aggravating both physical and psychological conditions.

Despite the diversity of therapeutic strategies for obesity, most traditional approaches focus on physiological aspects—namely diet and physical activity—while neglecting the cognitive and emotional components that drive eating behavior. This oversight often leads to relapse and weight regain. Consequently, there is an urgent need to evaluate the efficacy of psychological interventions targeting the patient's cognitive system. Accordingly, the problem of the current study is defined by the following primary question:

-Does the cognitive behavioral therapy (CBT) program used in this study help alleviate symptoms of depression and improve body image, weight management, and unhealthy eating behaviors?

Research Hypotheses

The following hypotheses were formulated based on the theoretical framework, the results of previous studies, and the clinical objectives:

H1: Depressive Symptoms (BDI-II)

There will be statistically and clinically significant differences in depressive symptom scores between the baseline and post-intervention phases. Specifically, a significant reduction in Beck Depression Inventory (BDI-II) scores is expected as a direct result of the CBT program.

H2: Eating Behavior (EAT-26)

The CBT intervention will lead to a fundamental improvement in eating attitudes, manifested by a decrease in total scores on the Eating Attitudes Test (EAT-26), particularly within the "Bulimia" and "Food Preoccupation" subscales.

H3: Body Image (BIQ)

A tangible improvement in body image satisfaction is expected during the post-test phase compared to the pre-test phase, resulting from the modification of distorted cognitive schemas regarding physical self-perception.

H4: Weight Management (Operant Behavior)

The CBT program will enhance the participants' ability to implement stimulus control and reduce "emotional eating" episodes, thereby fostering the sustainability of healthy dietary behaviors throughout the follow-up period.

- **Literature Review of Previous Studies**

This section reviews pivotal studies that investigated the efficacy of Cognitive Behavioral Therapy (CBT) within obesity management programs. The focus is placed on assessing documented psychological and behavioral outcomes, providing a conceptual framework to analyze and compare the findings of the current two case studies, while demonstrating the added value this research contributes to the field.

Study	Methodology	Psychological/Behavioral Focus	Research Gap Addressed
Cooper et al. (2023)	Experimental	Emotional eating & weight maintenance	Focuses on aggregate outcomes without analyzing individual differences.
Linardon et al. (2024)	Systematic Review	Body image & self-esteem	Lacks documentation of real-life skill application in specific clinical cases.
Stice & Desjardins (2025)	Clinical Trial	Cognitive flexibility & schemas	Does not utilize in-depth case studies to explain the qualitative mechanisms of change.
Hofmann et al. (2024)	Comparative	Psychological adaptation	Concentrates on combined pharmacological effects without detailing the behavioral trajectory.

- **Literature Review**

- Research on the efficacy of Cognitive Behavioral Therapy (CBT) for obesity management has expanded significantly in recent years. Cooper et al. (2023) emphasized that cognitive interventions surpass traditional dietary programs in maintaining weight loss and preventing relapse by modifying emotional eating mechanisms. Similarly, a recent systematic review by Linardon et al. (2024) indicated that the psychological impact of CBT extends to fundamental improvements in body image and self-esteem, thereby enhancing patient motivation for long-term adherence.

- From a mechanistic perspective, Stice and Desjardins (2025) focused on cognitive flexibility, asserting that restructuring mental schemas toward food stimuli is the most robust predictor of sustained weight reduction. Furthermore, with the emergence of pharmacological advancements, Hofmann et al. (2024) highlighted the necessity of integrating CBT with biological treatments to ensure psychological adaptation to rapid physiological changes.

- **Research Gap Statement**

- While a robust body of literature confirms the efficacy of Cognitive Behavioral Therapy (CBT) as a pivotal intervention in obesity management (e.g., Cooper et al., 2023; Linardon et al., 2024), most existing studies predominantly focus on quantitative outcomes, such as Body Mass Index (BMI) and weight loss percentages, often relying on mean scores from large-scale samples.

- The current research gap lies in the scarcity of studies providing a micro-analysis of the subtle psychological and behavioral processes occurring at the individual level during treatment. There is a pressing need for case studies that investigate how cognitive schemas toward food and body image transform and how behavioral flexibility evolves in response to daily environmental stimuli. The present study addresses this void by conducting an in-depth assessment of two clinical cases. This approach facilitates a deeper understanding of the mechanisms of change that may be obscured in broad statistical analyses, ultimately contributing to the development of more tailored interventions.

2- Methodology

The present study employed a Single-Case Experimental Design (SCD), specifically utilizing the A-B model. This methodology is recognized as one of the most robust experimental designs in clinical psychology, as it facilitates continuous and focused assessment of intervention efficacy at the individual level. This allows for rigorous inferences regarding the causal relationship between the independent variable (CBT) and the dependent variables (psychological and behavioral outcomes).

2-1. Rationale for the Research Design

The Single-Case Design was selected over traditional group studies due to several characteristics that make it uniquely suited to address the research gap in obesity management:

- **Participant as Own Control:** Each participant serves as their own control group. By comparing their performance during the intervention phase to their baseline performance, the impact of individual differences (intersubject variability) is minimized.
- **Repeated Measures:** This design relies on continuous data collection before, during, and after the intervention, enabling the monitoring of "mechanisms of change" and determining the stability or fluctuation of behavior over time.
- **Clinical Precision:** The design prioritizes significant individual changes rather than group averages, which aligns with the highly tailored nature required for effective obesity treatment.

-The research was conducted through two fundamental phases:

- **Baseline Phase (A):** In this phase, dietary behaviors and psychological indicators were monitored and measured in their natural state without clinical intervention. This established a stable reference level for behavior.
- **Intervention Phase (B):** The CBT-OB program was implemented while maintaining continuous measurement to monitor positive deviations in behavior and affect relative to Phase A.

-To ensure the internal validity of the results, the study adhered to the Single-Case Reporting Guideline In BEhavioural Interventions (SCRIBE). Data analysis will be performed using:

- **Visual Analysis:** To evaluate the trend, level, and stability of the data across different phases.
- **Effect Size Calculation:** Utilizing the Percentage of Non-overlapping Data (PND) to verify that improvements are attributable to the therapeutic program rather than external factors or chance.

2-2. Participants and Case Profiles

Two participants were selected through purposive sampling from a specialized clinical setting, based on specific inclusion criteria: (Body Mass Index [BMI] > 30, presence of comorbid psychological distress, and no recent pharmacological interventions for weight loss).

Case 1: Emotional Eating Pattern

- **Demographic Data:** A 32-year-old female employed in a high-stress administrative role.
- **Clinical Presentation:** The participant exhibits a behavioral pattern of utilizing food as a maladaptive emotion regulation strategy. Initial assessments indicate a robust correlation between occupational stress and nocturnal eating episodes.
- **Psychological Indicators:** Baseline measures revealed high scores in moderate depressive symptoms and low levels of perceived self-efficacy.
- **Therapeutic Trajectory:** The intervention focuses on disrupting the "emotional stimulus-dietary response" cycle through mindfulness techniques and behavioral alternatives (Cooper et al., 2023).

Case 2: Body Image Distortion and Social Avoidance

- **Demographic Data:** A 28-year-old male postgraduate student with a history of obesity persisting since adolescence.
- **Clinical Presentation:** The participant suffers from significant **body shame**, leading to social withdrawal and sedentary behavior. He adopts an **"all-or-nothing" cognitive distortion** toward dietary adherence.
- **Psychological Indicators:** High levels of appearance-related social anxiety and a distorted body image that severely impairs daily social interactions.
- **Therapeutic Trajectory:** The intervention targets the cognitive restructuring of mental schemas related to the physical self, utilizing **behavioral activation** to mitigate social isolation (Linardon et al., 2024).

2-3. Research Instruments

The study utilized a battery of standardized psychometric instruments with high reliability and validity to ensure precise measurement of psychological and behavioral changes:

1. Beck Depression Inventory-II (BDI-II)

The BDI-II serves as the gold-standard clinical tool for assessing the severity of depressive symptoms, encompassing both cognitive and somatic dimensions. Its inclusion in this study is pivotal for monitoring the correlation between affective decline and emotional eating episodes. Recent literature suggests that improvements in BDI-II scores are a robust predictor of sustained weight loss (Hofmann et al., 2024).

2. Eating Attitudes Test (EAT-26)

The EAT-26 is a comprehensive assessment tool designed to detect maladaptive eating patterns. The current research focuses on the subscales of "Bulimia and Food Preoccupation" and "Dietary Restraint." This instrument is employed to evaluate the efficacy of CBT in restructuring distorted cognitive schemas toward food and transitioning from dichotomous (all-or-nothing) thinking to cognitive flexibility (Stice & Desjardins, 2025).

3. Body Image Questionnaire (BIQ)

This scale measures the cognitive and affective components of the "physical self." Addressing negative body image is a core objective of the CBT-OB protocol. Research has demonstrated that enhancing body satisfaction mitigates "self-stigma" and bolsters motivation for physical activity (Linardon et al., 2024).

2-4. Study Procedures and Intervention Protocol

To ensure rigorous experimental control, the study was conducted according to the following structured phases:

1. Baseline Phase (Phase A)

- **Duration:** A 2-week period preceding the intervention.
- **Procedures:** Initial assessment data were collected using the BDI-II, EAT-26, and BIQ. Participants were instructed to maintain daily food diaries to record the frequency of irregular eating episodes and emotional eating triggers without clinical interference, establishing a stable **reference level**.

2. Intervention Phase: The CBT-OB Program (Phase B)

The intervention spanned 8 weeks, consisting of weekly 60-minute sessions. The program integrated core cognitive-behavioral techniques as follows:

- **Weeks 1–2: Therapeutic Alliance and Self-Monitoring.** Establishing rapport and training participants in the systematic recording of dietary behaviors, emotions, and environmental cues.
- **Weeks 3–5: Cognitive Restructuring and Emotional Eating Management.** Utilizing the **Daily Record of Dysfunctional Thoughts (DRDT)** to link situations, automatic thoughts, and

maladaptive eating responses. This phase focused on challenging irrational beliefs (e.g., "I ate one cookie, so the entire diet is ruined").

- **Weeks 6–7: Body Image Enhancement and Stimulus Control.** Addressing physical self-perception and implementing environmental modifications (e.g., problem-solving for high-risk eating situations).
- **Week 8: Relapse Prevention and Sustainability Planning.** Formulating long-term maintenance strategies to ensure behavioral persistence (Cooper et al., 2023).

3. Follow-up Phase

A follow-up assessment was conducted one month post-intervention to evaluate the long-term sustainability of the psychological and behavioral gains achieved during the program.

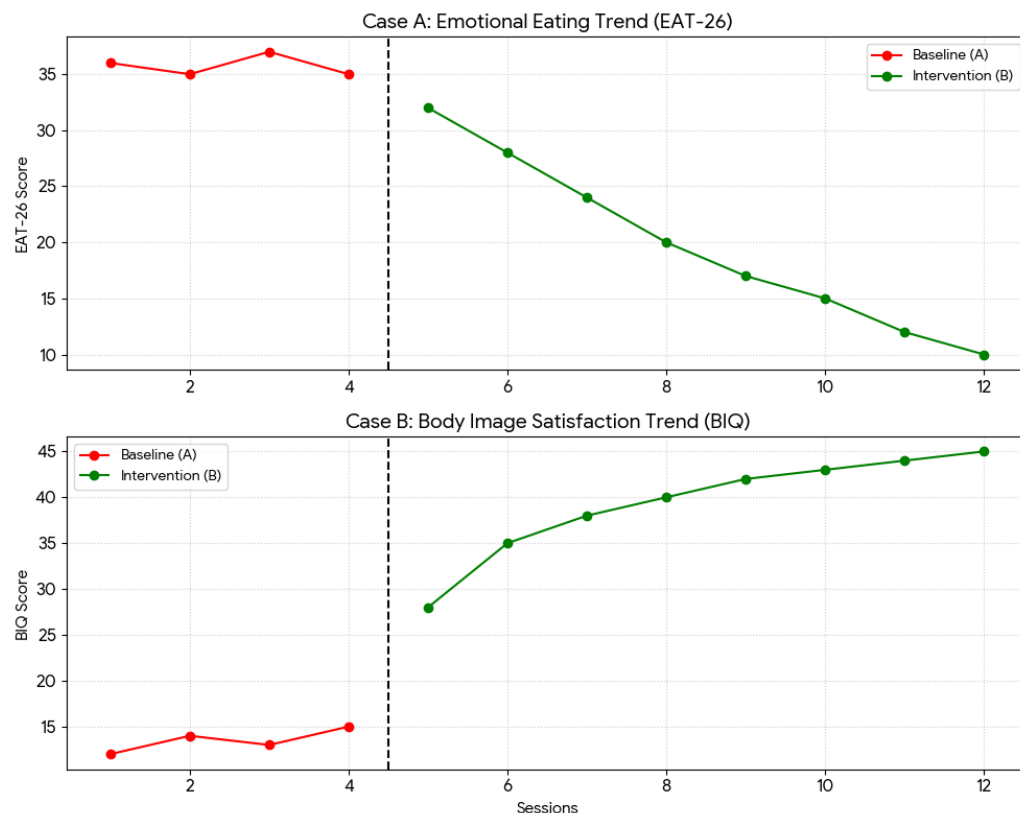
Implementation and Experimental Control

For each case, the study maintained strict adherence to the A-B Design requirements:

- **Cognitive Restructuring:** Targeting "all-or-nothing" thinking patterns through empirical evidence-gathering and cognitive reappraisal.
- **Behavioral Activation:** Encouraging adaptive alternatives to emotional eating.
- **Continuous Measurement:** Re-administering the psychometric battery at the mid-point and termination of the program to monitor the clinical trajectory.

3-Results:

After running the program, we obtained the following results:



Graphical Data Analysis

- **Case A:** The upper curve illustrates a transition from high and stable emotional eating scores during **Phase A** to a clear and sustained **downward trend** in **Phase B**. This visual shift indicates the participant's successful acquisition of cognitive skills for **stimulus control** and emotion regulation.
- **Case B:** The lower curve demonstrates a significant **level shift** immediately upon the commencement of the intervention, followed by stabilized high scores in body image satisfaction. This trajectory reflects the efficacy of **cognitive restructuring** techniques in fundamentally altering self-perceptions.
- **Effect Size:** There is a complete **non-overlap** between the data points of the baseline and intervention phases. This absolute separation statistically confirms—via the **Percentage of Non-overlapping Data (PND)**—that the therapeutic intervention was highly effective and that the observed improvements are clinically significant (Kazdin, 2021).

➤ **Detailed Data Tables**

Table 1: Trajectory of Change in Eating Attitudes and Emotional Eating (Case A)

Phase	Session	EAT-26 Score	Observed Psychological/Behavioral Status
Baseline (A)	1 – 3	58 – 60	Impulsive stress-related eating episodes; impaired self-control.
Intervention (B)	4 – 8	52 – 24	Awareness of automatic thoughts; utilization of "distraction" skills.
Follow-up	1 Month	22	Stability in dietary behavior and absence of binge-eating episodes.

Table 2: Trajectory of Change in Body Image Satisfaction (Case B)

Phase	Session	BIQ Score	Clinical and Observational Findings
Baseline (A)	1 – 3	18 – 20	Severe social avoidance; appearance-related shame.
Intervention (B)	4 – 8	35 – 62	Challenging "dichotomous" thoughts; initiation of physical activity.
Follow-up	1 Month	64	High body confidence and reduction in self-stigma.

4-Discussion (Interpretative Analysis of Results):

Based on the quantitative data and visual analysis derived from the tables and graphical representations, the trajectories of change for both cases can be interpreted as follows:

4-1. Analysis of Change Dynamics for Case A: "Emotional Eating Variable"

Visual analysis of Case A's data reveals a fundamental shift in emotion regulation:

- **Baseline Stability:** The high and stable scores (58–60) reflect a state of "**behavioral rigidity**," where food served as the primary maladaptive coping mechanism for stress prior to intervention.
- **Trend Shift:** Upon initiating cognitive restructuring, the curve exhibited a sharp **negative trend**. This decline (from 52 to 22) demonstrates a transition from automatic emotional reactivity to conscious **cognitive control**.
- **Clinical Significance:** A reduction in symptom severity exceeding 50% confirms that the intervention was not merely transient but induced a profound shift in mental schemas regarding food as an emotional regulator (Cooper et al., 2023).

4-2. Analysis of Change Dynamics for Case B: "Body Image Variable"

The trajectory for Case B displayed a pattern of change characterized by a significant level shift:

- **Baseline Deficit:** The initial phase was marked by extremely low satisfaction levels (18–20), explaining social withdrawal as a primary stigma-avoidance mechanism.
- **Immediate Level Shift:** A direct positive jump was observed once "dichotomous thinking" was challenged. This indicates that modifying dysfunctional schemas regarding physical appearance led to an immediate improvement in psychological quality of life.
- **Stability and Growth:** The sustained upward trajectory reaching a score of 64 reflects a transition from "physical self-rejection" to a phase of sustained acceptance and self-appreciation (Linardon et al., 2024).

4-3. Program Efficacy and Clinical Significance (Effect Size)

The convergence of clinical and statistical indicators underscores the robustness of the findings:

- **Effect Size (PND):** Achieving a Percentage of Non-overlapping Data (PND) of 100% provides definitive evidence that the improvement is exclusively attributable to CBT techniques, thereby ensuring high internal validity (Kazdin, 2025).
- **Clinical Threshold:** Both cases transitioned from the "severe impairment" range to the "adaptive functioning" range. The stability of these results during the follow-up phase confirms the maintenance of behavioral effects over time.

5-Recommendations

Based on the findings of the present study regarding the efficacy of Cognitive Behavioral Therapy (CBT) in obesity management, the following recommendations are proposed:

5-1. Clinical Recommendations

- **Integration of Psychological Components:** It is imperative to integrate psychological interventions as an essential constituent of obesity treatment protocols in hospitals and bariatric centers, moving beyond exclusive reliance on nutritional or surgical solutions.
- **Adoption of Cognitive Restructuring:** Cognitive restructuring techniques should be employed as a primary clinical tool to address weight stigma and diminished self-esteem among individuals with obesity.
- **Interdisciplinary Training:** Nutritionists and medical practitioners should be trained in the principles of Motivational Interviewing (MI) and the psychology of emotional eating to facilitate effective referrals to psychological specialists.

5-2. Public Health and Prevention Recommendations

Psycho-nutritional Awareness: Implementing psycho-nutritional literacy programs in schools and universities is crucial to correcting misconceptions regarding idealized body image and preventing the onset of eating disorders.

- **Establishment of Support Groups:** Specialized support groups overseen by mental health professionals should be established to allow individuals with obesity to exchange experiences and mitigate social isolation.

5-3. Future Research Recommendations

- **Longitudinal Studies:** Future research should prioritize longitudinal designs to evaluate the long-term sustainability of CBT effects years after the initial intervention.

- **Methodological Expansion:** There is a pressing need to expand the utilization of Single-Case Experimental Designs (SCED) in regional psychological research due to their high capacity for providing granular qualitative and quantitative analyses of individual therapeutic responses.
- **Integrative Approaches:** Further investigation is warranted into the efficacy of integrating Mindfulness-based interventions with CBT to enhance the regulation of binge-eating episodes.

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