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# EFFECTIVENESS OF A PSYCHO-EDUCATION PROGRAM FOR ADOLESCENTS WITH EXOGENOUS OBESITY: DEVELOPMENT AND PILOT STUDY*

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## ABSTRACT

Obesity is a substantial public health problem worldwide. Food restriction methods are generally advised as a remedy, but their effect remains limited if the negative behavioral patterns that cause obesity are not changed. The present study aimed to develop an intervention program, in line with The Obesity-Related Behavioral Intervention Trials (ORBIT) model for behavioral treatment development, to alter the negative eating behaviors (such as emotional eating, impulsive eating, and automatic eating) in adolescents with obesity and increase their subjective well-being. The investigation was based on a single-group pretest-posttest repeated measures design used to evaluate the changes in emotion regulation skills, subjective well-being, and body mass index (BMI). Participants in the intervention program consisted of 11 adolescents aged 15-16 years with a BMI ≥95$^{th}$ percentile (female=6; 54%, and male=5; 46%) and underwent a 15-week psycho-education program. The pilot study results showed that 88% of the participants completed the program with decreased emotion regulation difficulties and a significant increase in subjective well-being. Besides, BMI values showed a remarkable decrease concerning pretest and post-test values. Overall, the proposed psycho-education program can be considered applicable and effective against adolescent obesity, promising practical usability as an innovative and comprehensive approach to tackle the prominent health issue. Further studies with large samples are recommended to affirm the current results.

**Keywords:** Adolescent, Emotion Regulation, Health Psychology, Obesity

# EKZOJEN OBEZİTESİ OLAN ERGENLERE YÖNELİK PSİKO-EĞİTİM PROGRAMININ ETKİNLİĞİ: GELİŞTİRME VE PİLOT ÇALIŞMA

## ÖZET

Obezite dünya çapında önemli bir halk sağlığı sorunudur. Gıda kısıtlama yöntemleri genellikle tavsiye edilir, ancak obeziteye neden olan olumsuz davranış kalıpları değiştirilmezse etkileri sınırlı kalır. Bu çalışmada, obezite ile ilgili davranışsal tedavi geliştirme (ORBİT) modeli ile uyumlu olarak obezitesi olan ergenlerin olumsuz yeme (duygusal yeme, dürtüsel yeme, otomatik yeme) davranışlarını değiştirecek ve öznel iyi oluşlarını arttıracak müdahale programı geliştirme çalışması yürütmek hedeflendi. Araştırmada duygu düzenleme becerileri, öznel iyi oluş ve beden kitle indekslerinde (BKİ) değişimlerin test edilmesi için tek grup öntest-sontest tekrarlanan ölçüm tasarımı kullanıldı. Müdahale programına katılan katılımcıların yaşları 15-16 arasında değişen BMI ≥ 95. persentil olan 11 ergenden (kız= 6 %54; erkek= 5 %46) oluşmaktadır. Katılımcılara 15 haftalık psikoeğitim programı uygulanarak sonuçlar analiz edildi. Pilot çalışmanın sonuçları incelendiğinde; programa başlayan katılımcıların % 88 i programı tamamladı. Duygu düzenleme becerilerinde anlamlı düzeyde iyileşme görülürken ve öznel iyi oluşlarının arttığı görüldü. Ayrıca öntest-sontest BKİ anlamlı düzeyde azalma olduğu sonucuna ulaşıldı. Genel itibarıyla hazırlanan psikoeğitim programının ergenlerin obezite mücadelesinde hem uygulanabilir hem de etkili olduğu görülmektedir. Program Obezite gibi önemli bir halk sağlığı sorunu ile mücadelede yenilikçi ve kapsamlı bir yaklaşım olarak pratikte kullanılabilirliği vaat ediyor. Bu nedenle daha geniş örneklemler üzerinde de kullanılarak mevcut sonuçların desteklenmeye ihtiyacı vardır.

**Anahtar Kelimeler:** Duygu Düzenleme, Ergen, Obezite, Sağlık Psikolojisi

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## 1. INTRODUCTION

In the last 40 years, lifestyle changes have increased the incidence of some health problems worldwide. Obesity, a prominent one among these, is a disease that requires a multifaceted approach regarding both its causes and consequences. The prevalence of overweight or obesity has tripled worldwide since 1975, prompting The World Health Organization to name obesity as a global epidemic in 1997. Approximately 2.8 million people die annually from related causes (WHO, 2021).

Obesity is a significant public health issue. Studies have shown that childhood obesity leads to comorbidities later in life. Thus, it has been a primary concern to prevent obesity in childhood and adolescence, as the volume of scientific output in this respect testifies (Akıncı, 2021). The disease is highly complicated regarding its causes and consequences and, therefore, hard to treat. Accurate identification of the disease factors is essential to effective treatment. Recent developments have allowed for higher accuracy in etiology, leading to better treatment outcomes.

The causes of obesity are classified as exogenous and endogenous. Exogenous obesity is defined as a chronic imbalance between energy intake and energy expenditure arising from unhealthy eating habits, adverse experiences, lack of physical activity, psychological triggers, socioeconomic level, familial issues, and poor stress response (Akıncı, 2021; Becker, Rapps & Zipfel et al., 2007: 421). Endogenous obesity, on the other hand, develops due to underlying connate factors, such as endocrine or genetic disorders and related drug use (Crino et al., 2003: 462).

The principal effect of psychological factors, a foremost cause of exogenous obesity, is on eating behaviors, which mean far more than satisfying physiological needs in obese individuals. Emotional eating is primarily associated with exogenous obesity (Thayer, 2003: 69). The term is widely used for consuming hyperpalatable energy-dense foods in response to negative emotions (Konttinen, Van Strien, Männistö, Jousilahti & Haukkala, 2019: 9-10). Studies have shown that emotional eating is not directly prompted by negative emotions but by the regulation strategies used against them (Evers, Marijn Stok & de Ridder, 2010: 793-794).

Another negative dietary pattern is impulsive eating caused by an urge to compulsive action (Thamotharan, Lange, Zale, Huffhines & Fields, 2013: 259), a strong tendency to be affected by olfactory and visual stimuli (Havermans, Giesen, Houben & Jansen, 2011: 129), and a feeling of deprivation that occurs with food restriction, leading to binge eating (Polivy & Herman, 1999: 162).

The third dietary pattern generally linked to obesity is automatic eating, in which the individual almost indeliberately eats with little consideration or control throughout the process (Bargh & Chartrand, 1999: 476). In this case, the individual eats not because of hunger but under the influence of external stimuli such as the sight or smell of food or because it is mealtime (Tuomisto, Tuomisto, Hetherington & Lappalainen, 1998: 218). These three negative eating behaviors associated with exogenous obesity can be observed as single-standing or, occasionally, as an intertwined pattern.

The broad-range etiological evaluation of exogenous obesity has resulted in various interventions. Programs based on cognition, emotions, and behaviors have been proposed, as well as others based solely on physical activity or food restriction. Experimental studies on interventions for adolescent obesity have so far focused on variables considered within the scope of psychopathology, such as abnormal eating behavior (Rovira et al., 2013), cognitive therapy (Jelalian et al., 2019), mindfulness (Cotter, Hornack, Fotang, Pettit & Mirza, 2020), and emotion regulation (Hadley et al., 2020). A recently introduced approach in the literature has been positive

psychology, which focuses on individual character strengths and behaviors promoting well-being (Rozehnalova, 2018), as opposed to interventions focused on psychopathology, attempting to alleviate symptoms (Cotter et al., 2020; Hadley et al., 2020; Jelalian et al., 2019; Rovira et al., 2013).

### 1.1.Theoretical Framework of the Intervention Program

In the present study, empirically supported studies in the literature were reviewed first, as well as experimental interventions. Generally, emotion regulation studies on adolescent obesity are limited, although they are effective in weight loss (Hadley et al., 2020). There is a relationship between emotion regulation strategies and emotional eating, although the effect level is low (Harrist, Hubbs-Tait, Topham, Shriver & Page, 2013). Harris et al. (2013) found that reactivity to anger and anxiety was consistently associated with emotional eating in a study of 782 children. Maladaptive emotion regulation deficits such as ruminative thinking have increased adolescent food cravings (Kubiak, Vögele, Siering, Schiel & Weber, 2008). Effective emotion regulation skills development could reduce vulnerability during emotional problems and distress. It may also prevent the development of maladaptive emotion regulation strategies such as unhealthy eating behavior (e.g., emotional eating, sedentary behavior) associated with obesity (Aparicio, Canals, Arija, De Henauw & Michels, 2016).

Mindfulness, another area used in treating obesity, is often recommended to support weight loss rather than as a separate intervention (Cotter et al., 2020). Cotter et al. (2020) investigated the effectiveness of mindfulness intervention in their study on 11 adolescents with obesity. They reported BMI and emotion regulation changes with no statistically significant difference and small effect sizes. The authors commented that mindfulness intervention could strengthen available behavioral programs (Cotter et al., 2020: 5). In another study of adolescents with obesity, Kumar et al. (2018) indicated that mindful eating intervention is not effective in lowering BMI or BMI z-score but promotes mindfulness (Kumar et al., 2018: 4-6). Mindfulness interventions are generally recommended as supplementary to obesity treatment (Cotter et al., 2020; Kumar et al., 2018).

Psychopathological interventions alleviate symptoms, but a more holistic approach is necessary. Knowing the motivation behind the negative behavior rather than just focusing on the symptom is essential. Treatment should include interventions in many areas, such as psycho-education, coping with negative emotions, preventing rumination, and developing healthy living habits (Kafes, Ülker & SAYAR, 2018). Therefore, the present study proposes an intervention program in line with the biopsychosocial approach based on the dual-factor model (Ryff & Singer, 1998; Suldo & Shaffer, 2008). It has considered mental health as a complete state consisting of not only the absence of disease or disorder, as in the traditional psychopathology-oriented approach (Suldo & Shaffer, 2008: 63-64), but also the presence of favorable factors such as life satisfaction, self-esteem, and social contribution (Ryff & Singer, 1998). The aim is not only to eliminate the symptom but also to enhance well-being and provide a holistic approach encompassing emotion, cognition, and behavior. While determining psychopathological variables, the intervention program in this study targeted emotional, impulsive, and automatic eating patterns. Therefore, the variables of emotion regulation, impulsivity, and mindfulness were structured on the negative side of the intervention and subjective well-being on the positive side for step-by-step analysis (Table 1).

In treating child and adolescent obesity, family participation is paramount to preventing drop-outs and promoting compliance. Halliday et al. (2014) concluded that significant associations were reported between family functioning and childhood overweight and obesity. They also reported that low-income family functioning was associated with an increased risk of obesity and overweight in children and adolescents (Halliday, Palma,

Mellor, Green & Renzaho, 2014). In another study, Tura (2014) reported improved relationships with parents, positively altered eating habits, balanced diet, and healthier and happier feelings in adolescents due to a family-oriented approach to treating obesity (Tura, 2014: 83-84). Therefore, in the present study, one parent of the adolescent patients was included in the "Parental Intervention Program." Overall, the psycho-education program aimed to provide the participants with information, motivation, and coping strategies.

### 1.2. Aim and hypotheses

If not effectively counteracted, obesity will continue to be a worldwide health issue and cause a massive economic burden in the future. Psychological interventions are indispensable in the fight against the disease. Accordingly, in this pilot study on adolescent obesity, the aim has been to evaluate the applicability and efficacy of the intervention program developed to regulate negative eating patterns and promote subjective well-being. The following hypotheses were tested.

H1- Body mass index scores of adolescents with obesity before the intervention will decrease significantly after the intervention.
H1a- Emotion regulation scores of adolescents with obesity before the intervention will decrease significantly after the intervention.
H1b- Subjective well-being scores of adolescents with obesity before the intervention will increase significantly after the intervention.

## 2. METHODS

This study used a single-group pretest-posttest repeated measures design in line with Phase Ib of the Obesity-Related Behavioral Intervention Trials (ORBIT) model proposed by Czajkowski et al. (2015). The ORBIT model provides a framework in which general and specific goals and methods are defined for improving the design of interventions for obesity-related behaviors. Phase Ib has particular features addressing the acceptability and tolerability of treatment, the mode of administration, practical aspects such as dose and duration, and expected response (Czajkowski et al., 2015: 974-975). Instead of establishing precise estimates of the program's effectiveness, this pilot study focused on its structural compatibility, applicability, and sustainability, followed by preliminary evidence regarding efficacy.

### 2.1. Participants

The study population consisted of adolescents with obesity aged 15-16 who presented to the Erciyes University Faculty of Medicine Pediatric Endocrinology Outpatient Clinic. Convenience sampling was used to select the participants. The investigation was carried out on adolescents and their parents in the trial group. Inclusion criteria were informed consent (the adolescent and the parent), age 15-16, and a BMI ≥95th percentile for gender and age. Exclusion criteria were non-consent (either the adolescent or the parent), inability to participate in the program (e.g., physical limitations), presence of endogenous obesity (due to endocrine or genetic disorders and related drug use), mental retardation, psychotic disorder, weight loss program, and related drug use.

### 2.2. Procedure

Ethics committee approval to conduct the study was obtained from the Yıldız Technical University University Social and Human Sciences (approval number: 2021/11). Institutional approval and permission to use pretest-posttest measurement scales were obtained from the Erciyes University Faculty of Medicine Pediatric

Endocrinology Outpatient Clinic. A clinical psychologist interviewed the patients for eligibility assessment. Fifty-six patients who met the inclusion criteria were contacted by telephone. Of these, 24 refused to participate in the program, and 32 were invited for face-to-face interviews.

The intervention program was introduced to 16 candidates who presented for the meeting. Informed consent forms were obtained from 11 patients and their parents who agreed to participate in the study. Pretest applications were completed in June 2022. Three participants stated that they decided to leave the program without attending the first session. Interviews with the remaining 8 participants started in July 2022. One patient dropped out after two sessions, so their data were excluded from the evaluation. The 15-week program was completed with seven adolescents. Parallel to these, psycho-educational sessions were conducted with parents. At the end of the intervention, post-test measurements were carried out, and data collection was completed. Figure 1 shows the CONSORT flowchart (Grant et al., 2018) for the participants' eligibility, recruitment, and retention rates from the beginning of the investigation to the end of the experimental process.

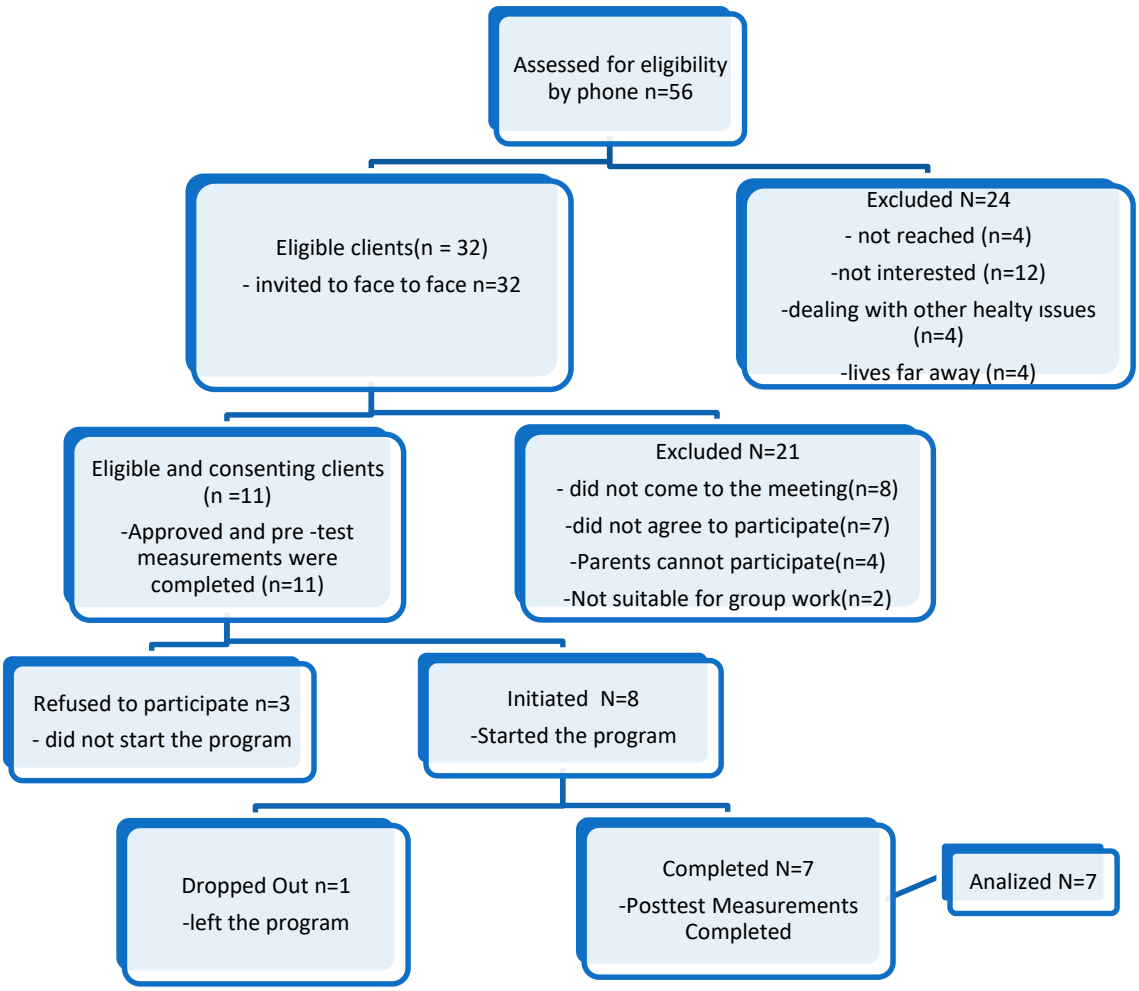


**Figure 1. Consort Flowchart of Participants from Baseline to Completion of Study**

### 2.3. Structure of the Obesity Intervention Program

The obesity intervention program in this study was structured to analyze step-by-step the components of emotion regulation, impulsivity control, and mindfulness on one side and subjective well-being on the other.

Positive psychology practices were applied in both aspects. Each session offered participants exercises and tasks to promote mindfulness and subjective well-being. Table 1 shows program themes and content in detail.

**Table 1. Obesity Intervention Program**

| | Theme / Purpose | Contents |
|---|---|---|
| 1. | introductory session | Introduction of the intervention program<br>Determining realistic goals |
| 2. | Recognizing Obesity/mindfulness | Sharing Stories with Disease<br>Theoretical information about obesity<br>Body awareness with breathing exercises |
| 3. | Recognizing Obesity/mindfulness | Causes of obesity<br>Behavior patterns that cause obesity to continue (emotional eating, impulsive eating, automatic eating) |
| 4 | *Healthy Eating Habits* | Awareness of the required amount of energy<br>Preparing a nutrition program focused on healthy nutrition<br>My Engagement list activity for happiness |
| 5 | Recognizing emotions/mindfulness | Emotion naming exercise<br>Observing automatic reactions in the face of positive or negative emotions,<br>Functional Response Production Effect<br>The Raisin Exercise |
| 6 | The function of emotions | Giving appropriate reactions in the face of the feeling felt<br>Understanding the relationship between thought, emotion, and behavior<br>producing positive thought<br>Relaxing meditation work |
| 7 | Hunger Awareness | Hunger tips and symptoms<br>Symptoms of emotional hunger and physical hunger<br>My reasons for eating emotional |
| 8 | Satiety awareness | Physical needs and satiety symptoms<br>Capturing signs of satiety in your own life<br>Smile meditation |
| 9 | Problem-solving | Problem-solving steps<br>Sharing their gratitude in their lives |
| 10 | Impulsive eating | Discuss situations that activate eating.<br>Participants are asked to list the characteristics that affect them while eating (Smell, taste, image, accessibility.).<br>Positive Capture Game |
| 11 | Impulsive eating and coping strategies | Introduction of Avoidance and Prevention Techniques<br>Relaxation against impulsive stimuli |
| 12 | Impulsive eating and coping strategies | Internal affirmations: Affirmation application<br>Compliment activity |
| 13 | Impulsive eating and coping strategies | Stop foods (To say no to foods that contain smell, taste, and visuality)<br>My New Engagement list activity for happiness |
| 14 | Emergency Plan | Making a Plan of Emergency<br>My future goals and action plan |
| 15 | Termination session | General Evaluation of the Program<br>Goodbye |

### 2.4. Parent intervention program

The program for parents aims to provide them with an understanding of the intervention process, promote awareness of obesity, and improve skills of positive parenting, communication, problem-solving, and coping with behavioral abnormalities, parallel to the program for adolescents.

### 2.5. Therapist training and supervision

The therapist who conducted the psycho-educational group work throughout the trial process is a clinical psychologist with an MA degree and currently a student of Ph.D. in psychological counseling, with training completed in positive psychotherapy, positive psychology, mindfulness, and meditation. Both intervention programs (i.e., adolescent and parent) were carried out using standard procedures considering the following

aspects before and after each session: (a) structural compatibility (duration of the session, number of participants); (b) material content compatibility (adequacy of psycho-educational content, appropriateness of the activity and its application).

### 2.6. Measurements

*Anthropometric Measurement*

Each participant's body weight and height were recorded before and after the program. Weight was measured using a digital scale with minimal clothing and no shoes. Height was measured using a wall-mounted stadiometer. In general practice, obesity and overweight are assessed by the body mass index (BMI), which is the individual's weight in kilograms (kg) divided by the square of the height in meters ($m^2$) ($kg/m^2$) (WHO, 2021). This study used age-standardized values for Turkey to evaluate adolescent BMI (Ozturk et al., 2011: 118-119).

*Difficulties in Emotion Regulation Scale (DERS)*

The DERS scale developed by Gratz & Roemer (2004) consists of 36 items in a 5-point Likert type and has six sub-dimensions. Its translation to Turkish and validity and reliability study was carried out by Sarıtaş-Atalar, Gençöz & Özen (2015) for the age group of 14-17. High scores indicate the difficulties experienced in the relevant dimension. The internal consistency of DERS showed a Cronbach's α coefficient of .93. The coefficient in the present study was calculated as .78.

*Adolescent Subjective Well-Being Scale (ASWBS)*

ASWBS was developed by Eryılmaz (2009) and consists of 15 items in a 5-point Likert type and has four dimensions: (i) satisfaction of family relationships, (ii) satisfaction of relationships with significant others, (iii) positive affect, (iv) life satisfaction. High scores indicate better use of the relevant strategy. The scale's internal consistency showed a Cronbach's α coefficient of .86 (Eryılmaz, 2009). The coefficient in the present study was calculated as .89.

*The Family Nutrition and Physical Activity (FNPA) Screening Tool*

The FNPA was developed by Iowa State University researchers Ihmels et al. (2009) in collaboration with the Academy of Nutrition and Dietetics (American Dietetic Association, ADA). Its current version consists of 20 items in a 4-point Likert type and has one dimension. The translation of FNPA into Turkish was carried out by Özdemir, Terzi, and Dundar (2022). There is no cut-off value to compare the total scores, so high scores indicate a low risk for obesity regarding the family environment and child behaviors, whereas low scores indicate a high risk. The scale's internal consistency showed a Cronbach's α coefficient of .76. The coefficient in the present study was calculated as 68.

### 2.7. Acceptability And Feasibility of Treatment

The actual session durations were recorded for each week alongside targeted session durations in line with the structural compatibility of the program. The mean targeted duration was 90 minutes. At the end of each session, participants were asked to rate two questions on the Session Evaluation Form between 1 and 10 (from lowest to highest): i) I think the content of today's session was sufficient; ii) I was satisfied with today's session.

### 2.8. Data Analysis

Basic variables are expressed as mean, standard deviation (SD), and range. Cronbach's α coefficients were used to assess the internal consistency and reliability of the psychometric scales included in the study. Due to the small size of the data set and the non-normal distribution observed (Shapiro-Wilk test p-value<.05), the differentiation between pretest and post-test results was analyzed (at the end of the 15-week process) by the Wilcoxon signed-rank test. The effect size of the significant differences thus obtained was calculated using Rosenthal's formula $r = Z\sqrt{N}$ (Pallant, 2011: 198-199). Effect sizes were interpreted according to Cohen's classification as small for r=.10-.29, medium for r=.30-.49, and large for r= ≥.50 (Cohen, 1988: 81-82). Statistical significance was set at p<.05. All analyses were carried out using the software package IBM SPSS Statistics for Windows, Version 23.0.

## 3. RESULTS

The age range of the participants was 15-16. Height measurements varied between 1.62-1.85 cm and weight between 77.40-122.80. BMI calculations revealed that all participants met the obesity criteria standardized according to age and gender. 2 participants had no family members with obesity (29%), while 5 participants (71%) had a mother or siblings with obesity. 88% (5 female and two male) of the participants who started the intervention program completed the whole process. 100% of them attended 13 to 15 (mean 13.86) sessions. The duration of the sessions was between 60 and 90 minutes. This generally met the target, but sessions 7 and 8 remained below the mean duration (60 min and 65 min, respectively). In the post-session evaluations, the participants rated the sufficiency of the sessions at a mean of 9.94 points and satisfaction at 10 points (Table 2).

**Table 2. Demographic and Clinical Characteristics**

| | M (SD) | Range |
|---|---|---|
| Adolescent Age | 15.43±0.54 | 15-16 |
| Gender- n (%) | | |
| Female | 5 (%71) | |
| Male | 2 (%29) | |
| Weight Variables | | |
| Adolescent weight | 101.24±16.84 | 77,40-122,80 |
| Adolescent boy | 1.69±.08 | 1.62-1.85 |
| Adolescent BMI | 35.24±5.31 | 28.89-43.13 |
| Obese in the family | No | 2 (%29) |
| | mother | 4 (%57) |
| | Brother | 1 (%14) |
| Structural Variables and Satisfaction | | |
| Participation in Sessions | 13,86 (%92.4) | 13-15 |
| Program Completion Rate | % 88 | |
| Session times (minute) | 82.67±11.16 | 60-90 |
| SEF-a | 9.94±.08 | 9-10 |
| SEF-b | 10 | 10-10 |

SEF-a Session Evaluation Form a) I think the content of today's session is enough. SEF-B Session Evaluation Form b) I was satisfied with today's session."

A Wilcoxon Signed Rank pretest and post-test measurements revealed that the BMI of the participants (p<.05, Z=-2.197) with a large effect size (r=.58). Similarly, DERS scores significantly decreased (p<.05, Z=-2.197) with a large effect size (r=.58). However ASWBS scores significantly increased (p<.05, Z=-1.997) with a large effect size (r=.53). Finally, FNPA scores significantly increased (p<.05, Z=-2.371) with a large effect size (r=.63) (Table 3).

**Table 3. Wilcoxon Sign Rank Tests Examining Changes in Primary Study Variables**

| | Baseline mean (SD) | Post mean (SD) | **Baseline-post** | **Wilcoxon signed-rank test** | | | | | **Effect size** |
|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **mean±ss** | **mean±ss** | | **Negative ranks.** | **Pozitive ranks** | **Ties** | **z** | **p** | **r** |
| **BMİ** | 35.24±5.31 | 34.06±5.53 | -1,18 | 6 | 1 | 0 | **-2.197** | **.028** | **.58** |
| **Emotion regulation scale** | 101.57±17.14 | 74.85±15.45 | -26,72 | 6 | 1 | 0 | **-2.197** | **.028** | **.58** |
| Clarıty | 14.71±4.54 | 10.28±3.09 | -4,43 | 6 | 1 | 0 | -1863 | .063 | .49 |
| Awareness | 20.00±2.58 | 12.29±3.54 | -7,71 | 7 | 0 | 0 | **-2.388** | **.017** | **.64** |
| Impulse | 14.14±7.90 | 13.57±6.08 | -,57 | 4 | 3 | 0 | -.339 | .734 | .10 |
| Non-acceptance | 15.00±10.29 | 10.14±3.43 | -4,86 | 4 | 2 | 1 | -1.363 | .173 | .36 |
| Goals | 18.14±4.22 | 12.57±5.35 | -5,57 | 5 | 2 | 0 | -1.863 | .063 | .58 |
| Strategıes | 19.57±7.00 | 16.00±5.32 | -3,57 | 5 | 2 | 0 | -1.524 | .128 | .41 |
| **Adolescent Subjective Well-being** | 44.71±8.20 | 50.00±6.95 | 5,29 | 1 | 5 | 1 | **-1.997** | **.046** | **.53** |
| satisfaction with family relationships | 13.14±1.95 | 13.71±1.50 | ,57 | 2 | 3 | 2 | -.962 | .336 | .26 |
| satisfaction with significant others' relationships | 11.43±2.23 | 12.86±3.02 | 1,43 | 2 | 4 | 1 | -1.476 | .140 | .64 |
| life satisfaction | 6.28±2.81 | 9.14±1.77 | 2,86 | 0 | 5 | 2 | **-2.060** | **.039** | **.55** |
| positive feelings | 13.86±2.55 | 14.28±1.70 | ,42 | 1 | 4 | 2 | -.677 | .498 | .18 |
| **FNPA** | 47.42±5.62 | 67.28±3.30 | 19,86 | 0 | 7 | 0 | **-2.371** | **.018** | **.63** |

BMI- Body Mass Indeks; FNPA- The Family Nutrition and Physical Activity Screening Tool

## 4. DISCUSSION

This study aimed to evaluate the acceptability, feasibility, and potential efficacy of a psycho-educational intervention program for adolescents with exogenous obesity developed within the framework of the dual-factor model (Ryff & Singer, 1998; Suldo & Shaffer, 2008) by considering negative eating behaviors and subjective well-being together. A single-group pretest-posttest repeated measures design was used in line with Phase Ib of the ORBIT model (Czajkowski et al., 2015: 974) to improve the program based on the feedback obtained.

Seven (88%) participants who started the intervention program completed the process. The mean number of sessions attended was 13.86 (%92.4). In the published literature, the duration of intervention programs for obesity ranges between 6 and 14 weeks, and completion rates between 73% and %84 (Cotter et al., 2020; Hadley et al., 2020). So, the completion rate and the mean session duration and attendance in the present study are higher than the literature, which points to a more comprehensive engagement in the program. Besides, the low level of drop-out (N=1, 12%) is remarkable in terms of the program's effectiveness. A primary difficulty in the struggle against obesity is the lack of motivation in patients regarding program commitment and sustainability (Findholt, Davis & Michael, 2013: 22). Participants' perceptions of session sufficiency and satisfaction enhance motivation and contribute positively to the effectiveness of the intervention. The sessions were between 60 and 90 minutes, in line with other adolescent intervention programs in the literature (Boutelle, Braden, Knatz-Peck, Anderson & Rhee, 2018; Hadley et al., 2020). So, the targets were met, but sessions seven and eight remained below the mean duration, which suggests that these sessions should be revised or combined to achieve standardization.

Though not typically essential in pilot studies (Czajkowski et al., 2015: 974), the program's effectiveness was also assessed. The primary focus of the intervention was weight loss by improving emotion regulation skills and promoting mindfulness. At the end of the program, the participants' levels of BMI had significantly decreased (mean -1.18 kg), DERS had decreased, and subjective well-being had increased. In contrast to published literature, the present study targeted emotion regulation skills, mindfulness, and subjective well-being in

combination, so the program was developed within the framework of the dual-factor model (Ryff & Singer, 1998; Suldo & Shaffer, 2008).

Emotion regulation was the main item targeted on the negative side of the intervention. The results showed that the program was effective regarding DERS. Various studies have reported the association between emotion regulation strategies and eating behaviors (Aparicio et al., 2016: 18). In a study of adolescents with obesity (N=30, *M*age:14.6), Boutelle et al. (2018) reported that emotion regulation skills help reduce adverse eating habits and facilitate weight loss. Similarly, an earlier study comparing standard behavioral weight control (SBWC) and an adolescent weight control intervention that combines emotion regulation ability building and behavioral weight control (HealthTRAC) indicated a higher decrease in BMI and improved emotion regulation for the latter (Hadley et al., 2020). The literature confirmed the hypotheses about emotion regulation and BMI (H1-H1a) in the present study.

Subjective well-being was targeted on the positive side of the intervention in this study. It is known that individuals with obesity have low subjective well-being. In this regard, Berger (2004) reported a negative correlation (Berger, 2004: 52-53). Böckerman et al. (2014) also indicated similar results (Böckerman, Johansson, Saarni & Saarni, 2014: 863). In the present study, the participants' subjective well-being improved at the intervention's end (H1b confirmed). Subjective well-being does not directly influence BMI but is critical for reinforcing motivation and compliance and strengthening stress response. Various authors have reported a strong relationship between the stress factor and emotional eating behavior in obesity (Campagnolo, Johnston, Collatz, Staines, & Marshall-Gradisnik, 2017: 255).

In the present study, the psycho-education program for parents effectively countered high-risk family practices for adolescent obesity. Wong and Cheng (2013) also stated that the involvement of family members in the intervention improves efficacy (Wong & Cheng, 2013: 2524). Similarly, the present study has shown that the parental program contributed to intervention commitment and reduced environmental risk factors.

## 5. CONCLUSION AND LIMITATIONS

This pilot study aimed to develop an intervention program and assess its structural compatibility and applicability in line with preliminary evidence regarding efficacy. Although the results showed that the intervention program was effective in weight loss, due consideration of study limitations is necessary.

Firstly, the sample size in this study was small. On the other hand, the effect sizes obtained are promising for applications with large case series. Secondly, the results are limited to adolescents between 15 and 16; therefore, the program should be tested for applicability in different age groups. Thirdly, evaluating long-term (e.g., six-month or one-year) outcomes will improve the effectiveness of the intervention.

In addition, revisions for both participants and clinicians are required to bolster the feasibility and acceptability of the program. For instance, it seems viable to combine sessions seven and eight to promote the integrity of content and to standardize duration. Besides, although the difference between the pretest-posttest measures of subjective well-being was significant, the effect size was minor, so additional positive psychology activities could remarkably contribute to that aspect.

The participants in this study rated session sufficiency and satisfaction highly, which is promising in terms of program applicability. Targeting the underlying factors of negative eating behaviors in exogenous obesity interventions facilitates healthy weight loss. The results of this study suggest that psycho-education programs

with comprehensive cognitive, behavioral, emotional, and social components will enhance effectiveness in adolescent obesity treatment. Further studies with large samples are recommended to support the current results.

## 6. IMPLICATIONS

The results obtained from this study have implications for three main areas.

Future Research: Although it is compatible with the literature, the effect of the intervention program needs to be supported by experimental studies with control groups. Longitudinal studies are also needed. As stated in the study's limitations, it is crucial to conduct research in different age groups.

Mental and Public Health Professionals: Although obesity is a chronic and metabolic disease, it is seen that psychological intervention is essential. In particular, professionals working with these patient groups (psychologists and psychological counselors) should not neglect psychological interventions. As additional information, testing the dual-factor model in obesity in different studies will provide essential findings.

Educators: Preventive mental health practices are important in obesity. Psychological counselors, who have the opportunity to reach a significant number of adolescents in society, can reduce the rate of increase of this chronic disease by conducting group work in schools, especially in terms of protective and preventive guidance.

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