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Impact of a psychological intervention on weight management and psychological well-being in patients with overweight and obesity

BACKGROUND

Obesity is one of the most significant public health challenges of the 21st century, with important consequences for physical and psychological health. Recent evidence suggests that psychological factors such as stress, emotion regulation, and self-esteem play an important role in treatment, adherence, and effectiveness.

PARTICIPANTS AND PROCEDURE

This study followed a quasi-experimental longitudinal design. A sample of 129 adult patients classified as having overweight or obesity completed validated self-report measures assessing anxiety symptoms, depressive symptoms, self-esteem, and food craving. The sample was divided into a control group and an intervention group, which underwent a six-month psychological intervention. Data analysis included ANOVAs and regression models.

RESULTS

Participants who received the psychological intervention showed significant improvements in anxiety, depressive symptoms, emotional eating, and self-esteem. The intervention was also associated with greater reductions in body

mass index (BMI) and a lower mean BMI at 12 months compared with the control group. Anxiety reduction showed a large effect size (Cohen's $d = 0.94$), while moderate effects were found for depressive symptoms and emotional eating.

CONCLUSIONS

The findings suggest that integrating psychological support into multidisciplinary obesity treatment programs may contribute to improved psychological well-being and weight-management outcomes. The Mediterranean diet may also contribute to BMI reduction. The lack of significant differences between men and women, or between overweight and obesity groups, suggests similar baseline characteristics across these subgroups. Participants who voluntarily agreed to participate may have shown higher baseline motivation for behavioral change. The findings should be interpreted with caution due to the non-randomized design and potential self-selection bias.

KEY WORDS

obesity; overweight; psychological intervention; eating behavior; mental health; body image

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BACKGROUND

Obesity has been identified as one of the most significant global public health challenges of the 21st century, with significant consequences for physical and psychological health (WHO, 2025). The prevalence of obesity has increased alarmingly, affecting approximately 16% of the world's adult population (WHO, 2025). Obesity is linked to cardiovascular diseases, type 2 diabetes, and musculoskeletal disorders, as well as psychological issues such as depression, anxiety, and low self-esteem (Rubino et al., 2020).

Recent evidence has highlighted the prevalence of body image disturbances and body dysmorphic symptoms among individuals with overweight and obesity, particularly following the COVID-19 pandemic (Pawłowska et al., 2025).

While the traditional approach to overweight and obesity focuses on diet and physical exercise, recent evidence suggests that psychological factors such as stress, emotion regulation, and self-esteem play a crucial role in treatment adherence and effectiveness (Van Strien, 2018). Previous research has shown that patients with high levels of anxiety and depression have more difficulty maintaining weight loss, highlighting the need for targeted psychological interventions within overweight and obesity management programs (Fruh et al., 2021).

This study aimed to evaluate the impact of a psychological intervention on weight reduction and maintenance in patients with overweight and obesity, as well as its effect on key psychological variables such as anxiety, depression, and self-esteem.

PARTICIPANTS AND PROCEDURE

PARTICIPANTS

The sample consisted of 129 adult patients diagnosed with overweight or obesity, with a body mass index (BMI) of 25 or higher, according to the World Health Organization (2025) criteria. Participants ranged in age from 18 to 65 years. They were divided into two groups: a control group of 73 individuals, who received standard treatment without psychological intervention, and an intervention group of 56 individuals, who participated in a structured cognitive-behavioral therapy program. Participants were recruited using convenience sampling.

Participants were not randomly assigned because participation in the psychological intervention depended on willingness and availability to attend treatment sessions. Consequently, a quasi-experimental non-randomized design was adopted.

Inclusion criteria required participants to be adults within the aforementioned age range, with a clinical diagnosis of overweight or obesity confirmed by a healthcare professional.

Participants were required to commit to attending at least 80% of the sessions and to provide informed consent for participation.

Individuals diagnosed with severe, unstabilized psychiatric disorders, such as schizophrenia or severe bipolar disorder, were excluded. Also excluded were individuals using psychotropic medication with effects on emotion regulation, those simultaneously participating in other weight-loss programs, pregnant women, and individuals with medical conditions that prevented attendance at group sessions.

To ensure comparability between groups, preliminary analyses were performed using Student's *t*-tests and chi-square tests to verify that there were no statistically significant differences between the groups in sociodemographic and clinical variables such as age, sex, and obesity level. Preliminary analyses indicated no statistically significant differences between the control and intervention groups in the sociodemographic and clinical variables assessed at baseline, with *p*-values greater than .05, supporting the comparability of the groups prior to the intervention (Table 1) (Cohen, 1988).

The study was approved by the Research Ethics Committee of Universidad Europea (approval code: CIPI213006.4; approval date: June 30, 2021). All participants provided written informed consent prior to

Table 1

Sample characteristics according to study groups

Variable	Control group	Intervention group
Number of participants	73	56
Mean age	45.21	43.22
Baseline BMI (kg/m ²)	32.36	32.57
Sex		
Male	18	11
Female	55	45
Physical activity (<i>n</i> participants)		
None	40	26
Low	29	27
Moderate	3	1
Substance use (<i>n</i> participants)		
Without substance use	49	32
With substance use	24	23

participation in the study. The study was conducted in accordance with the ethical principles established in the Declaration of Helsinki.

INSTRUMENTS

For participant assessment, standardized questionnaires widely validated in the scientific literature were used. Regarding anxiety, the State-Trait Anxiety Inventory (STAI) by Spielberger et al. (1982), composed of 40 Likert-scale items, was used to assess both state and trait anxiety. Depression was measured using the Beck Depression Inventory-II (BDI-II) by Beck et al. (1996), a 21-item instrument designed to assess depressive symptoms with high reliability in clinical populations. Self-esteem was assessed with the Rosenberg Self-Esteem Scale (Rosenberg, 1965), consisting of 10 Likert-scale items that measure global self-esteem. Meanwhile, emotional eating and impulsive eating were assessed with the Food Craving Questionnaire-Trait developed by Cepeda-Benito et al. (2000), comprising 39 items designed to measure the intensity and frequency of food cravings.

Anthropometric measurements included recording weight, height, and body mass index, following the procedures established by the World Health Organization (2025). All measurements were taken by professionals trained in anthropometry, using a calibrated scale and a stadiometer.

PROCEDURE

All participants received the same nutritional intervention and dietary follow-up program, whereas only the intervention group received psychological treatment.

The nutritional intervention consisted of a program based on the Mediterranean Diet, designed according to the recommendations of the Spanish Federation of Societies of Nutrition, Food and Dietetics (FESNAD), the Spanish Society for the Study of Obesity (SEEDO), and the Spanish Society of Community Nutrition (SENC) (Aranceta, 2016).

The dietary plan was personalized, taking into account individual preferences, while respecting an average macronutrient distribution of 28-30% fat, 45-50% carbohydrates, and approximately 20% protein. The diet was reviewed periodically and adjusted according to patient adherence and the results obtained. Follow-up visits included assessment of substance use, physical activity, anthropometric measurements, and adjustments to the dietary plan. The intervention lasted 12 months, with mandatory visits at 3, 6, and 12 months, and additional check-ups at 9 months, conducted in person or by telephone.

The psychological intervention was applied exclusively to the intervention group and consisted of a structured, six-month program with a total of 24 weekly 30-minute sessions conducted online, following the guidelines of the American Psychological Association's guide to telepsychology practice (Joint Task Force for the Development of Telepsychology Guidelines for Psychologists, 2013). The therapy adopted an integrative approach, combining techniques from cognitive-behavioral therapy, brief strategic therapy, acceptance and commitment therapy, and solution-focused therapy, among others. Each phase of treatment included psychological assessment, evaluation of emotional factors related to eating, cognitive restructuring, mindfulness, and self-acceptance strategies.

The intervention included psychoeducation about emotional eating, cognitive restructuring techniques, emotion regulation strategies, mindfulness-based exercises, self-monitoring tasks, and behavioral activation components. Sessions followed a semi-structured format adapted to participants' clinical needs while maintaining common therapeutic objectives across the intervention program.

STATISTICAL ANALYSIS

Quantitative variables were analyzed using descriptive statistics, such as the arithmetic mean and standard deviation, while qualitative variables were analyzed using absolute and relative frequency analysis. To explore associations between categorical variables, the chi-square test was used, with Fisher's exact test applied when the expected values were less than five.

The Shapiro-Wilk test was used to assess the normality of the data distribution. If the data distribution was not normal, non-parametric tests such as the Mann-Whitney *U* test were applied to compare differences in means between independent groups. For repeated measurements within the same group, the Wilcoxon signed-rank test was used. When there were more than two measurements, ANOVA was used for normally distributed data, and the Friedman test was used for non-normally distributed data. *P*-values less than .05 were considered statistically significant. Effect sizes (Cohen's *d*) and 95% confidence intervals were calculated.

The analysis was performed using Stata software version 15, to ensure the accuracy of the calculations and guarantee the reproducibility of the results.

RESULTS

Analyzing the sample under study, 129 patients were recruited from 4 different locations and 5 nutritional centers, located in Barcelona, Madrid, Santander and

*Psychological
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Las Palmas de Gran Canaria. Figure 1 shows the percentage of patients recruited per center.

Regarding sex, the sample was predominantly female, with 100 participants, 55 of whom belonged to the control group and 45 to the intervention group, compared to 29 male participants, 18 of whom were in the control group and 11 in the intervention group.

As for the age of the participants, all were adults, with a mean age of 44.35 years ($SD = 11.78$).

With respect to body mass index (BMI), the mean baseline BMI of the sample was 32.45 kg/m² ($SD = 3.61$). The majority of participants were obese (87) compared to overweight (42).

The study of physical activity revealed high rates of sedentary behavior; 66 participants (52.38%) reported not engaging in any type of physical activity, while 60 participants reported doing so. This variable had 3 “missing” values and could not be studied in those participants. Figure 2 shows percentages of the type of physical activity performed by the participants.

Regarding the use of psychotropic drugs, 81 participants (63.28%) were not taking any medication or using drugs, compared to 47 patients (36.72%) who were.

In the subgroup analysis of 71 patients, the following information was obtained: 8 patients (11.27%) consumed alcohol and 17 (23.94%) were smokers.

Regarding the use of drugs and/or psychotropic substances, 7 patients (9.86%) were taking antidepressants or benzodiazepines; 12 patients (16.90%) were taking antihypertensive medication; 3 subjects (4.23%) were taking medication for digestive disorders; 5 patients (7.04%) were taking thyroid medication; 1 patient (1.41%) was being treated for diabetes

mellitus; and 9 patients (12.86%) were taking some type of medication for hypercholesterolemia.

Regarding personal history, the records of 128 patients were analyzed, with 1 missing. The records were categorized according to the major groups defined in ICD-11. The analysis revealed that 11 subjects (8.59%) had genitourinary conditions; 10 (7.81%) musculoskeletal disorders; 1 subject (0.78%) had dermatological conditions; 15 participants (11.72%) had digestive disorders; 3 (2.34%) had respiratory disorders; 23 (17.97%) had circulatory disorders; 1 (0.78%) had an ear-related disorder; 8 (6.25%) had mental or behavioral disorders; 31 (24.22%) had other endocrine or nutritional disorders; 3 (2.34%) had a history of neoplasms, and finally, 10 (7.81%) had mild hematological diseases. No subject presented with diseases associated with the visual system, nervous system, immune system, infectious or parasitic diseases, or sleep-wake disorders.

Therefore, in the overall study sample, the most common pre-existing conditions were endocrine or nutritional diseases, other than obesity or overweight, followed by diseases of the circulatory system.

Regarding family history, it could be studied in 122 patients, with 7 missing data. The results were as follows: 1 patient (0.82%) had a family history related to the musculoskeletal system or connective tissue; 1 patient (0.82%) had a family history related to the nervous system; 2 patients (1.62%) reported a history of mental, behavioral, or neurodevelopmental disorders; 11 (9.02%) had relatives who had suffered from some type of neoplasm; 40 patients (32.79%) reported a family history of endocrine or nutritional disorders; and 42 subjects (34.43%) had a family history of circulatory system pathology. These last two, as with

Figure 1

Percentage of patients recruited per center

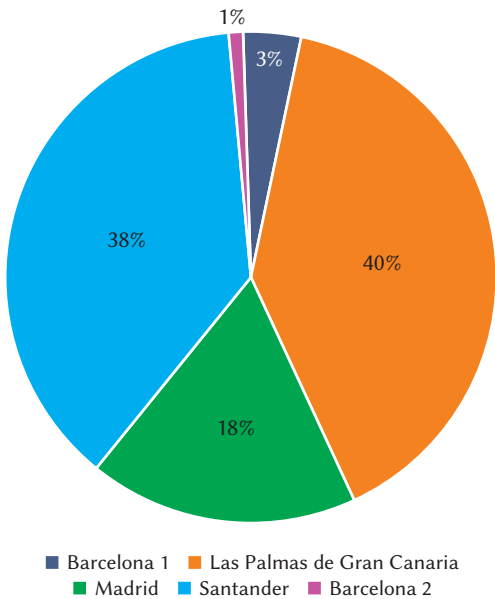
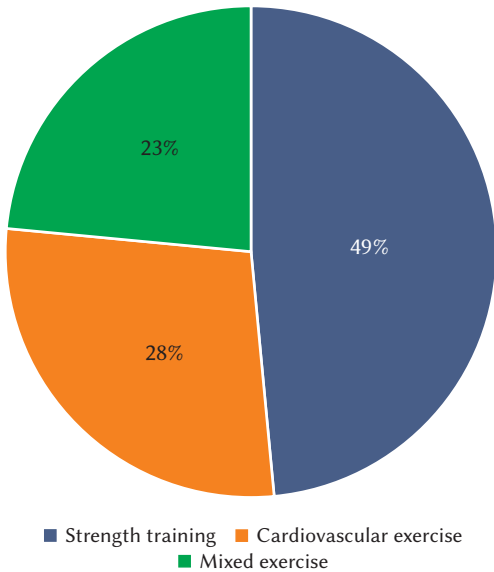


Figure 2

Distribution of physical activity types among participants



the personal medical history, were the most notable alterations in the sample.

Furthermore, no patient reported any family history of genitourinary, hematological, dermatological, infectious or parasitic, digestive, immune, visual, respiratory, ear or mastoid process disorders, nor sleep and wakefulness disorders.

BASELINE BMI STUDY ACCORDING TO BASELINE VARIABLES AND MEASUREMENTS

According to sex, the mean BMI of the 100 female participants was 32.36 kg/m² ($SD = 3.81$), a similar mean BMI to that of the 29 men, which was 32.78 kg/m² ($SD = 2.83$). The distribution of this variable was not normal. The Mann-Whitney U test showed no significant differences in baseline BMI according to sex ($p = .488$).

According to occupation (sedentary/non-sedentary), no significant differences ($p = .303$) or normal distribution were observed. The 102 subjects with sedentary occupations had a mean BMI of 32.57 kg/m² ($SD = 3.67$), compared to the 23 subjects with active occupations, whose mean BMI was 31.75 kg/m² ($SD = 3.38$).

When BMI was analyzed according to substance use, a non-normal distribution with significant differences ($p = .019$) was again observed. The mean baseline BMI (33.02 kg/m², $SD = 3.47$) was slightly higher in the 81 patients who did not use substances compared to the mean baseline BMI (31.48 kg/m², $SD = 3.71$) of the 47 patients who did. Therefore, this variable was monitored during subsequent visits to determine whether there were changes in consumption and, if changes were found, to study whether this affected weight and, consequently, BMI during the intervention and follow-up phases.

Regarding the frequency of physical activity, no significant differences were found ($p = .929$) across activity levels (zero, low, moderate, or high). The mean baseline BMI was 32.99 kg/m² ($SD = 3.44$) in the 66 patients with no physical activity; 31.92 kg/m² ($SD = 3.82$) in the 56 patients with low activity; and 29.50 kg/m² ($SD = 0.81$) in the 4 patients with moderate activity. No subjects reported high levels of physical activity. Although mean BMI values appeared lower among participants with higher physical activity levels, no statistically significant association was identified.

Circulatory and endocrinological/nutritional histories were also studied, as these were the most common personal histories. The results showed a non-normal distribution, and these differences were analyzed using the Mann-Whitney U test. Significant differences were found based on a personal history associated with circulatory system diseases ($p = .034$). The 23 pa-

tients with such a history had a higher baseline BMI (34.01 kg/m², $SD = 3.19$) compared to the 105 subjects without such a history (32.11 kg/m², $SD = 3.64$).

Regarding endocrinological/nutritional histories, no significant differences were found when analyzing baseline BMI ($p = .216$). The 31 patients who provided such a history had a baseline BMI of 31.89 kg/m² ($SD = 3.39$) compared to the 97 subjects without such a history, who had a baseline BMI of 32.63 kg/m² ($SD = 3.69$).

No significant differences were found in baseline BMI with respect to family history of circulatory system disease or endocrinological or nutritional history.

Psychological intervention in patients with overweight and obesity

SAMPLE CHARACTERISTICS ACCORDING TO STUDY GROUPS

Both sub-samples were studied to determine whether the groups were comparable. The results are presented in Table 1. No significant differences were found between the control group and the intervention group, allowing for the analysis of the intervention and follow-up phases.

ANALYSIS OF BASELINE PSYCHOMETRIC SCORES OF THE INTERVENTION GROUP

Baseline and final levels of anxiety, depression, emotional eating (craving), and low self-esteem were assessed. These analyses were performed using quantitative and categorical variables.

Regarding anxiety, the STAI questionnaire revealed a mean baseline anxiety score of 26.54 ($SD = 7.39$). The mean baseline trait anxiety score was 28.90 ($SD = 6.53$), with a mean total anxiety score (state + trait) of 55.43 ($SD = 13.07$).

The categorized results showed that, regarding state anxiety, 9 subjects (16.07%) presented low levels of anxiety, 44 subjects (78.57%) presented medium levels, and 3 subjects (5.36%) presented high levels. Regarding trait anxiety, 3 patients (5.36%) presented low levels, 50 subjects (89.29%) presented medium levels, and 3 participants (5.36%) presented high levels.

No significant differences were found in trait anxiety levels in relation to sex, but significant differences were found when analyzing mean state anxiety levels by sex ($p = .004$). These significant differences were also observed at the categorical level ($\chi^2(2) = 9.09$; $p = .011$), with women showing higher values.

Regarding mean state anxiety levels based on whether the subject was obese or overweight, no significant differences were found ($p = .702$), nor were significant differences observed in mean trait anxiety levels ($p = .412$).

At the categorical level, no significant differences were observed in state anxiety ($\chi^2(2) = 2.35$; $p = .308$)

or trait anxiety ($\chi^2(2) = 2.14$; $p = .343$), with overweight and obese subjects showing a very similar distribution.

To analyze depressive symptoms, the BDI questionnaire was used. At baseline, patients had a mean score of 21.14 ($SD = 11.34$). When analyzed by category, the results were: 15 participants (26.79%) with minimal depressive symptoms, 5 with mild depressive symptoms (8.93%), 20 with moderate depressive symptoms (35.71%), and 16 with severe depressive symptoms (28.57%).

No significant differences were found in the means according to sex ($p = .370$), being 18.36 ($SD = 4.18$) in the case of men and 21.82 ($SD = 1.60$) in the case of women. At the categorical level, no such significant differences were observed either ($\chi^2(3) = 4.79$; $p = .188$).

No significant differences were found in the mean depression scores depending on whether the subject was obese or overweight ($p = .230$). Similarly, no significant differences were observed categorically ($\chi^2(3) = 3.66$; $p = .300$), with overweight and obese subjects again showing a very similar distribution.

75% of the patients showed dissatisfaction with their body image, followed by 19.64% who presented mild dissatisfaction, and only 5.36% who reported no concern or very little concern. No significant differences were found according to sex ($\chi^2 = 1.15$; $p = .563$) or according to overweight or obesity status ($\chi^2(2) = 2.64$; $p = .267$).

The craving variable was analyzed using the CCE questionnaire, which revealed a mean baseline score of 21.16 ($SD = 6.95$). Categorical analysis revealed the following percentages: 36 cases (65.45%) belonging to the “clear emotional eater” category, 15 (27.27%) subjects belonging to the “emotional eater” category, 3 (5.45%) subjects identified as “somewhat emotional eater,” and only one patient (1.82%) was not an emotional eater.

No significant differences were found in the means according to sex ($p = .954$). No such significant differences were observed at the categorical level either ($\chi^2(3) = 1.11$; $p = .774$). In contrast, significant differences were observed according to overweight or obesity ($p = .002$). The obese group had a greater representation of subjects in the “clear emotional eater” group compared to the overweight group, which had its greater representation among subjects identified as “emotional eaters,” thus also showing significant differences in the analysis by categories ($\chi^2(3) = 11.69$; $p = .009$).

In the analysis of this variable, no differences were found between sexes, but notable differences were observed between overweight and obese subjects, with the latter showing a higher rate of emotional eating.

Regarding self-esteem, analyzed using the Rosenberg Self-Esteem Scale, the mean baseline score was

24.70 ($SD = 7.03$). Analysis by category revealed high percentages of low self-esteem. Twenty-eight subjects (50.00%) presented low baseline self-esteem, 13 (23.21%) average self-esteem, and finally, 15 (26.79%) high or normal self-esteem.

No significant differences were found in the means according to sex ($p = .682$). No significant differences were observed at the categorical level either ($\chi^2(2) = 1.45$; $p = .483$). Regarding the analyses according to overweight or obesity, no significant differences were found between the mean scores ($p = .105$), nor in the analysis by categories ($\chi^2(2) = 3.69$; $p = .158$).

ANALYSIS OF DIFFERENCES BETWEEN BASELINE AND FINAL PSYCHOMETRIC SCORES (AFTER PSYCHOLOGICAL INTERVENTION)

The analysis revealed a mean final state anxiety score of 19.53 ($SD = 7.45$), lower than the mean baseline score of 26.53 ($SD = 7.39$). Significant differences were found between the mean scores ($p < .001$). Relevant categorical differences were also found using McNemar’s test ($\chi^2(1) = 17.19$; $p < .001$), showing a decrease in state anxiety levels after the psychological intervention.

The mean depressive symptom score was 15.67 ($SD = 10.57$), lower than the mean baseline score of 21.14 ($SD = 11.34$). Significant differences were found between these mean scores ($p < .001$). There was a decrease in the proportion of participants with severe depressive symptoms, with an increase in lower levels of symptoms.

Regarding concerns about body image, the mean score also showed significant differences ($p < .001$). At the categorical level, there was also a decrease in cases with high levels of dissatisfaction, while mild levels increased.

The final mean score for craving was 16.45 ($SD = 8.03$), which was lower than the baseline mean score of 21.16 ($SD = 6.95$). Significant differences were found between these mean scores ($p < .001$). Categorically, there was a decrease in cases within the “clear emotional eater” category, with an increase in representation in the lower categories.

Regarding the mean self-esteem score, it was 27.02 ($SD = 5.87$), and therefore higher than the baseline mean score of 24.70 ($SD = 7.03$). Again, significant differences were found between these mean scores ($p < .001$). The number of cases with low self-esteem decreased.

The scores obtained in the baseline and post-intervention psychometric assessments showed statistically significant differences following the psychological intervention, indicating improvements in psychological variables among patients with overweight and obesity. However, the sampling used in this study was not randomized; participants chose whether to be in the control or intervention group.

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This may indicate a greater predisposition toward behavioral change and psychological support among participants in the intervention group. This could explain the high scores on the psychometric tests and, in turn, the significant improvement in these scores after the intervention.

Regarding the magnitude of these changes, the reduction in state anxiety showed a large effect size (Cohen's $d = 0.94$; 95% CI: 0.55-1.33). The reduction in depressive symptoms showed a moderate effect size (Cohen's $d = 0.50$; 95% CI: 0.12-0.88). The reduction in emotional eating/craving also showed a moderate effect size (Cohen's $d = 0.63$; 95% CI: 0.24-1.01). Finally, the increase in self-esteem showed a small-to-moderate effect size (Cohen's $d = 0.36$; 95% CI: -0.02-0.73).

ANALYSIS OF INTERVENTION AND FOLLOW-UP RESULTS

During the intervention and follow-up phase, physical exercise and substance use continued to be analyzed to assess whether changes occurred and their potential impact on BMI results. No changes were observed in substance use patterns in any of the patients; these remained constant from the baseline assessment. Changes in physical exercise were observed, as two subjects began physical activity (one at 3 months and the other at 6 months), but these changes were not statistically significant. Due to the minimal variation observed during follow-up, these variables were not included as covariates in the BMI analyses; however, their potential influence on the results cannot be completely ruled out.

In the follow-up of the mean BMI of overweight and obese subjects, a significant decrease was observed in both groups throughout the study. Overweight subjects had a baseline BMI of 28.32 ($SD = 0.99$), which decreased to 25.39 ($SD = 1.61$) at the end of the study at 12 months. In obese subjects, the mean BMI decreased from 34.44 ($SD = 2.57$) at baseline to 30.03 ($SD = 2.79$) at 12 months. Wilcoxon tests, appropriate due to the non-normal distribution, confirmed a significant decrease in BMI in both groups ($p < .001$). Frequency analyses showed an increase in overweight and normal-weight patients throughout the study, with a corresponding reduction in the proportion of participants classified as obese.

Throughout the study, BMI showed a significant decrease in both cohorts, from 32.52 ($SD = 3.61$) at baseline to 28.64 ($SD = 3.28$) at the end ($p < .001$). Although no significant differences were observed between the control and intervention groups at the 3, 6, and 9-month visits, the intervention group had a higher proportion of subjects with normal weight. Finally, at the end of 12 months, the intervention group showed a significantly lower average BMI (27.75) compared to the control group (29.32), sug-

gesting a possible beneficial association of the psychological intervention.

Therefore, the results indicate that the psychological intervention was associated with reductions and maintenance of BMI over time, with differences favoring the intervention group at the one-year follow-up. This suggests that the intervention not only improves emotional well-being but also facilitates weight management. Studies with longer follow-up and in randomized groups would help to confirm these effects and reduce potential self-selection bias.

At baseline, no significant differences in BMI were found between women and men (32.36 and 32.77, respectively). Both groups showed a progressive reduction in BMI during the study, with no significant differences at each visit. At 3 months, women began to show a slight improvement toward a normal weight, while in men this trend was not evident until 12 months. Overall, no significant differences were observed in BMI changes between sexes.

Analysis of adherence to nutritional follow-up showed no significant differences between the intervention and control groups ($\chi^2(1) = 0.00$; $p = .948$). At the baseline visit, 129 subjects participated (56 in the intervention group and 73 in the control group), and the sample decreased to 122 at 3 months and to 121 at 6 months after one dropout in the intervention group. At 9 months, there were no further dropouts, but at the end of the 12-month follow-up, one patient from the control group dropped out, resulting in 120 participants. It could not be concluded whether the psychological intervention affected dropout rates from nutritional follow-up, as no significant differences in completion rates were found between groups. Participants who agreed to engage in the intervention may have shown higher baseline motivation toward behavioral change.

To assess the reliability of the tests used, Cronbach's α was calculated for each one. The STAI analysis showed α of .96 for the state and .89 for the trait. For the BDI, α was .97, as was that of the Body Satisfaction Questionnaire (BSQ). For the CCE, α of .93 was obtained, and finally, the Cronbach's α for the Rosenberg scale was .84. These results indicate high reliability of the measurement tools used in the study.

DISCUSSION

This study suggests that psychological intervention may be associated with weight reduction and improvements in psychological variables among patients with overweight and obesity.

These findings reinforce the need for a multidisciplinary approach to obesity treatment, where psychological intervention may play an important role in adherence to lifestyle changes and in improving patients' emotional well-being.

The results showed a predominance of females in the study sample (100 women versus 29 men), which contrasts with previous epidemiological studies in Spain that report a higher prevalence of obesity in men at younger ages (Cooper et al., 2021). However, the scientific literature also indicates that, after age 60, this trend reverses, with a higher prevalence of obesity in women (Pérez-Hernández et al., 2017). This finding could be influenced by methodological factors, since the convenience sampling used in this study may have affected the sample distribution. In terms of age, the average age of the participants was 44 years, in a range between 18 and 65 years, coinciding with the data from the European Health Survey in Spain 2020 (INE, 2023), which identifies an increase in overweight in men from the age of 35.

Regarding physical activity habits, more than half of the participants (52.38%) did not engage in any type of activity, a figure consistent with the rates of sedentary behavior reported in the Spanish population (EESA-2020). The literature suggests that physical inactivity is a key factor in the development and maintenance of obesity, and that intervention programs that include physical exercise improve weight loss outcomes (Leung et al., 2020). Regarding substance use, 63.28% of the subjects did not take any medication or consume substances such as tobacco or alcohol, while 36.72% did report their use, with the latter two being the most frequent. Previous research has identified an association between excessive alcohol consumption and the risk of overweight and obesity, suggesting that alcohol intake contributes to excess calorie consumption and greater accumulation of body fat (Higuera-Sainz et al., 2017).

Regarding medical history, the most frequent conditions in the sample were endocrine and nutritional diseases (48.06%) and circulatory system diseases (32.55%). Obesity has been widely linked to comorbidities such as type 2 diabetes mellitus, hypertension, and dyslipidemia, conditions that increase the risk of metabolic and cardiovascular complications (Rubio-Almanza et al., 2019). These findings reinforce the need to address obesity from a comprehensive perspective, considering both the biological and psychological factors that influence its development and maintenance.

Regarding BMI evolution, no significant differences were found in baseline BMI based on sex, occupation, or physical activity, but differences were found in relation to medical history.

After the psychological intervention, a decrease in BMI was observed in 71.43% of participants in the intervention group, compared to 42.46% in the control group, and 9.52% of subjects in the intervention group reached values within the normal weight range. These results are consistent with studies that have demonstrated the effectiveness of psychological interventions in weight reduction (Chao et al., 2018),

although the scientific literature still debates the sustainability of long-term weight maintenance (Delgado Floody et al., 2015).

In addition to its effect on weight, the psychological intervention was associated with improvements in key emotional variables. A significant reduction in emotional eating was observed, with a decrease from 62.79% to 39.53% in the prevalence of “clear emotional eaters” in the intervention group. This finding is consistent with studies that have identified a direct relationship between craving and emotional dysregulation in obesity (Hilbert et al., 2018). A reduction in anxiety and depressive symptoms was also found: 57.14% of participants in the intervention group presented moderate or high levels of state anxiety at the beginning of the study, a percentage that decreased to 35.71% after the intervention. Regarding depressive symptoms, 46.43% of participants in the intervention group had scores within the moderate or severe depressive symptom range on the BDI-II before therapy, which decreased to 21.43% after the intervention. These data support previous research that has highlighted the relationship between obesity and mental health, suggesting that psychological intervention can significantly contribute to improving emotional well-being in this population (Acacio et al., 2017; Braden et al., 2018).

Another improvement observed is related to self-esteem and body dissatisfaction. At the beginning of the study, 50% of participants presented with low self-esteem, which decreased to 28.57% after the intervention. Regarding body dissatisfaction, measured with the Body Satisfaction Questionnaire (BSQ), 68.75% of participants in the intervention group showed scores in the moderate or severe dissatisfaction range before the intervention, which decreased to 37.50% after therapy. Previous research has indicated that a negative perception of body image is a factor that affects motivation and adherence to obesity treatment programs (González-Salazar et al., 2023).

The online modality used in this study has proven to be a viable alternative for psychological intervention, facilitating access to treatment and reducing economic and geographical barriers. However, the low initial motivation of some participants to receive psychological support suggests that sociocultural and stigmatizing barriers surrounding mental health persist (Fruh et al., 2021).

Several limitations should be considered when interpreting the findings of this study. First, the absence of randomization limits the internal validity of the design and prevents establishing causal relationships between the intervention and the observed outcomes. Participants self-selected into the intervention group, which may indicate higher baseline motivation and greater predisposition toward behavioral change. In addition, the multimodal nature of the intervention prevents identification of

the specific therapeutic components responsible for the observed improvements. Potential confounding variables such as lifestyle habits and physical activity were monitored but not experimentally controlled throughout the study. In addition, mediation analyses were not performed, limiting the understanding of the mechanisms through which the intervention may influence BMI and psychological outcomes. Furthermore, although effect sizes and statistical significance were considered, future studies with randomized designs and longer follow-up periods are needed to confirm the stability and generalizability of these findings. Therefore, the findings should be interpreted as associative rather than causal.

CONCLUSIONS

The study suggests that the addition of a structured psychological intervention to a nutritional treatment program may contribute to both weight management and improvements in psychological functioning among adults with overweight and obesity. The intervention was associated with reductions in BMI as well as improvements in anxiety symptoms, depressive symptoms, emotional eating, and self-esteem. These findings support the value of integrating psychological support into multidisciplinary obesity treatment programs.

Regarding BMI changes, the results indicate that both obese and overweight subjects experienced a significant reduction in their values after the intervention. The implementation of a nutritional plan based on the Mediterranean diet was associated with an overall decrease in BMI, with some participants even reaching values within the normal weight range. No significant differences were found between sexes, although obese subjects predominated in the male sample at the beginning of the study.

From a psychological perspective, the baseline assessment of participants in the intervention group reflected moderate levels of state anxiety, depressive symptoms, body dissatisfaction, a high prevalence of emotional eating, and low self-esteem. These parameters did not differ significantly between overweight and obese subjects or between sexes.

The changes observed after the intervention were significant in all the psychometric variables analyzed, suggesting improvements in emotional well-being. A decrease in anxiety and depression symptom levels, a reduction in emotional eating and body dissatisfaction, and an increase in self-esteem were observed. These results underscore the potential value of including psychological strategies in weight-loss treatments, as emotional state and body image may influence treatment adherence and success.

Furthermore, the results show that the group receiving psychological intervention had a significantly

lower mean BMI at the end of the study compared to the control group, suggesting a potential association between psychological support and improved weight outcomes. However, no significant differences were found in the nutritional follow-up completion rate between the groups, preventing a conclusion as to whether the psychological intervention contributes to reducing treatment dropout.

It is possible that participants who voluntarily agreed to participate in the study were initially more motivated to complete the process, which could have influenced these results.

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DISCLOSURES

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The authors declare no conflict of interest.

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