**Review Article**

**An Integrative Review of Weight Loss Interventions for Obese Adults**

**Krisi Amsden, DNP, RN#**

#College of Nursing and School of Allied Health, Northwestern State University of Louisiana, Louisiana, USA

**#Corresponding author:** Krisi Amsden, DNP, RN, Assistant Professor, College of Nursing and School of Allied Health, Northwestern State University of Louisiana, 1800 Line Avenue, Shreveport, Louisiana 71101, USA

**How to cite this article:** Amsden K (2023) An Integrative Review of Weight Loss Interventions for Obese Adults. *Int J Nurs & Healt Car Scie* 03(13): 2023-277.

**Submission Date:** 19 September, 2023; **Accepted Date:** 02 October 2023; **Published Online:** 05 October, 2023

**Abstract**

**Introduction:** Obesity is a world-wide health epidemic that can be linked to many additional health complications. Modest weight loss can improve one’s health tremendously. Weight loss is not a universal process for everyone.

**Research Methodology:** A detailed database search was conducted to find peer-reviewed, evidence-based literature to support the use of individualized weight loss interventions to support a successful weight loos program for obese adults.

**Results and Discussion:** The reviewed data suggests that the use of individualized weight loss interventions results in a greater weight loss than the individual utilizing a basic diet plan without the support of an interdisciplinary weight loss team.

**Conclusions and Further Recommendations:** Weight loss is not a uniform process for everyone. Individuals have different dietary and physical needs that must be addressed to promote weight loss. The use of individualized diets that meet one’s health and medical needs and the use of an exercise program that is physical possible for the participate result in greater weight loss versus the use of a generic or non-specific diet plan or exercise programs.

**Keywords:** Diet; Dietitian; Exercise; Obesity; Weight-loss

**Background and Significance to Healthcare**

Obesity is recognized throughout the world as a significant contributor to complications of many chronic health diseases and illnesses [1]. Obesity is also considered a chronic illness without comorbidities associated with other chronic health concerns [2]. Complications from obesity cause physical harm and cause a large amount of emotional damage to the patient and their family and friends. Obesity creates isolation and often lowers one's self-worth and leads to depression [1]. Obesity and depression have been linked to a bidirectional relationship. They are often linked to each other, and one factor is found to often lead to the other factor within this bidirectional and interlinked relationship; creating a vicious cycle that adds to the challenges faced by an obese patient trying to lose weight and improve their health [3].

The recognized practice problem is the increased health risks and complications that are caused by or related to obesity [2]. The worldwide population of overweight and obese individuals is over 1.9 billion or 39% and 600 million or 13% respectively [1]. The Global Burden of Disease (GBD) has found that the obese populations have more than doubled and even tripled in many countries around the globe. Along with the increasing obesity epidemic, numerous other health conditions are displaying increasing incidences [4]. With the rapidly growing obese population in the United State and throughout the world and the additional health complications related to obesity, the global economic impact of obesity was over $2 trillion [5].

In addition to the health complications that are related to obesity, obesity has societal costs that are shared by the nation. Obesity is credited with adding a $147 million strain to the Unites States healthcare system [2]. Obesity itself creates stress on many stakeholders throughout the United States. By adding this immense financial burden to any healthcare system, the entire country faces the economic strain that results from increases in the healthcare costs and insurance premiums. Society shares the added financial strain through higher insurance premiums and often less coverage due to the extra costs the insurance companies and the federal reimbursement agencies are paying [6]. Obesity is often considered an individual's problem, but it is a problem for the entire society and requires national support to combat this medical crisis. In addition to the increased cost of healthcare, the nation faces added costs due to the loss of productivity in the workforce because of obesity-related challenges [6].

Weight loss, even on a small percentage ratio, can increase one's physical and mental health [7]. Modest or moderate weight loss of 5-15% decreased incidences and complications associated with many chronic health conditions, such as diabetes and cardiac disease [1]. In addition, the weight loss also improved the participants mental health and quality of life by lowering depression and sexual dysfunction complications and by improving their sleep apnea symptoms. Improvements because of weight loss indicated overall better health and quality of life based on decreases in body weight based on the Look AHEAD survey that addressed several aspects of health and quality of life [8].

According to the CDC, the national prevalence of obesity has increased from 30.5% to 42.4% over the past two decades. The prevalence of obesity in Louisiana is at least 35% of the adult population [9]. In the central portion of the state, the prevalence is 35-38% which is near the state’s average [10]. This area faces 40% obesity compared to 36% of the state's population being considered obese. Despite this health factor statistic, the region is ranked in the higher end of the healthiest parishes but is in the middle to lower overall health outcomes within the state of Louisiana. This region has 10,800 premature deaths compared to 9,500 premature deaths statewide [11].

The identified practice problem related to obesity and other health concerns that result as health complications caused by obesity has effects on many stakeholders. Recognized stakeholders that are affected by the obesity epidemic include obese patients and their families, healthcare providers, local hospital leaders, insurance providers, and local business owners. The costs associated with obesity and its impact on an individual are paid, not only by the obese individual, but also the stakeholders [6].

**Purpose**

The purpose of this Integrative Review (IR) is to report the current literature findings related to successful interdisciplinary interventions to achieve weight loss success for obese adults. A successful weight loss intervention can combat the health complications related to and associated with the obesity epidemic. The interventions that were reviewed varied from specific diet adherence and guidance with coaching from a dietitian along with exercise plans designed to meet the physical abilities of the participants.

**Methodology**

**Review Protocol**

The IR consists of peer-reviewed evidence to support or negate the practice problem question related to weight loss interventions for the obese adult. Evidence-based information was collected from extensive database searches. The literature searches were conducted with the databases Cumulative Index to Nursing and Allied Health (CINAHL) and PubMed. The databases were selected based on previous years of use with success in obtaining nursing related, peer-reviewed literature.

The database searches were limited to current, full-text, English language peer-reviewed information no older than five years; 2018-2022. Quantitative meta-analyses, systematic reviews and randomized controlled trials were included in the literature that was considered for project inclusion. The initial searches utilized the key phrase of interdisciplinary weight loss. The results yielded limited project appropriate evidence-based literature. The searches were broadened by using less restrictive search criteria and keywords. The broader database searches utilized keywords of obesity, weight loss, exercise, diet, dietitian, or limited combinations of these keywords. The database searches yielded initial literature results of 24,899 articles. The search results were further reviewed. Evidence-based research that addressed weight loss with the use of diet and/or exercise was included.

**Inclusion/Exclusion Criteria**

Articles were considered for inclusion if they focused on weight loss interventions of diet and/or exercise. Articles that used specific diet or exercise plans to meet the individual needs of the participants. Included research was narrowed toward quantitative reviews and systematic reviews. Inclusion criteria also required the article to be written in English as a peer-reviewed article within the last five years of publication.

During the databases searches, many items were excluded from the search criteria due to specific study details. Data was removed from consideration if the sample population was not an obese or overweight adult with a Body Mass Index (BMI) > 30kg/m2. In addition, data was excluded if the study focused on the use of weight loss medication or surgery.

**Data Analysis**

The data collected and reviewed was organized based on the interventions being studied. Each article was compared to each other to determine any links or commonalities related to weight loss success. Each article was studied to identify the intervention tested and the data analysis to determine the findings of success or not. The included literature was deemed to be of high quality demonstrated rigorous data collection.

Beleigoli et al. [12] found that participants had a greater weight loss after a 24-week interval utilizing the platform coaching versus the waiting-list and no coaching. The platform for the two groups was access to a web-based program that delivered personalized feedback. One group had additional coaching added to their group. The results were quantitative and developed using the Python packages Panda and SciPy. The study had 923 participants aged 18-60 years of age with a BMI >25% complete the study. The platform groups had greater weight loss compared to the no coaching wait-list group. The mean weight loss in kg among the groups was 1.36kg for the platform with personalized coaching, 1.14 kg for the platform only groups and 0.56kg for the wait-list group with no coaching.

A study by Miller et al. [13] investigated the effects of diet and exercise in different combinations of use. They created three groups for participants to utilize diet, exercise, or diet and exercise together to understand the effects of these interventions on weight loss over an 18-month period. The quantitative data was collected with crude mean changes from the baseline measurements at 6- and 18-month assessments. The study included 388 obese participants with a BMI 27-41% and older than 55years of age. After the 18-month interval, the weight loss from the baseline measurements were 11.3% for the diet group, 10.3% for the diet and exercise group, and 1.1% for the exercise alone group.

Different exercise intensities were studied by Dorling et al. [14]. Intervention groups were established that utilized exercise but varied in expended energy to determine overall weight loss success based on initial exercise intensity with a dietary intervention. Dorling et al. [14] collected data following supervised exercise training at different intervals based on the measurement being collected while following a dietary recommendation. The quantitative data was collected via measurements and validated questionnaires that addressed behaviors and attitudes of eating and physical activity. The study included 312 females with a BMI 25-43kg/m2. The participants were randomly placed in one of four groups; no exercise group, exercise group to expend 4 kcal/kg/week (KKW), exercise group to expend 8 KKW, and exercise group aimed to expend 12 KKW. After a 24-week interval, the exercise groups’ results demonstrated weight loss of 0.8 kg for the 4KKW group, 1.2 kg for the 8 KKW group, and 3.2kg for the 12 KKW group. The findings indicated greater overall weight loss with more energy expended with increased exercise training.

Jessen-Winge et al. [15] conducted a qualitative interview of individuals. They found a commonality that linked weight loss success and program commitment to the need for exercise to be structured and on specific days. Another factor that was common among the participants was the need for physical activity to be relevant to their daily lives and activities. A qualitative descriptive design interviewed 34 participants, 12 males and 22 females, greater than 17 years of age with a BMI >25kg/m2. The participants were interviewed to find an understanding of what was deemed important by an individual during a weight loss program. The interviews revealed the importance of diet and exercise along with the inclusion of social support and including everyday life activities to achieve weight loss success.

Lim et al. [16] studied the use of a recommended diet and physical activity plan from a dietitian in a face-to-face meeting and then over 6-months of participation. A smartphone app was also used to track the participants’ participation in the different program aspects. The quantitative data was produced by comparing the mean changes in the individual measurements. The groups were randomly assigned from the 2014 participants with a mead BMI of 30.6kg/m2. Both groups received initial training along with diet and exercise activity advice for a dietitian. The intervention group utilized a smartphone app to maintain progress and communicate with the dietitian for six months. After the six-month trial, the intervention group had a significantly greater weight loss of 3.6 kg than the non-intervention group’s loss of 1.2kg.

Leung et al. [17] studied long-term adherence to lifestyle modifications that included diet and physical activity changes over 10-months. The participants were to follow a diet and exercise adherence plan for the measured time. The mixed-method study used a paired t-test to calculate weight changes. After the 10-month interval, the mean weight loss of the 140 participants that completed the 10-month trial was 5.8kg or 7.76% weight loss from baseline.

Nepper et al. [18] conducted a work-place study to identify the benefits of group activities and support along with individual appointments with the nutritionist and health experts over 16-weeks. The 41 participants were 19 years of age or older and were day-shift employees from a medical facility. The participants were required to have a BMI >29kg/m2. The participants had an average weight loss of 5.9kg (13 pounds) and 5.6% body weight. The participants participated in the Better Living intervention. The invention included 16 weeks of group meetings along with individual sessions to set physical goals and focus on health and nutrition with experts. The weekly group meetings offered education on proper diet and better dietary choices along with exercise specialist information related to physical activity. Results were yielded by comparing pre-and post-intervention measurements and the use of validated questionnaire surveys to assess diet and physical adherence. The Pittsburgh Sleep Quality Index (PSQI) and the nine-item self-administered Patient Health Questionnaire (PHQ-9) utilized sleep quality and depression respectively. Sleep duration did not change much but sleep quality scores indicated a significant improvement. The depression scores were also significantly lower following the 16-week interval.

Another study looked at sustained weight loss differences between individuals utilized counseling for diet and physical activity versus individuals that followed the same meetings but also added physical exercise to the program for over a 12-month follow-up period. The program was completed by 85 participants. The participants were placed into three groups; a control group of behavioral modification with no added exercise regimen and two groups that had exercise added to the behavioral modifications at the beginning of the study and one with exercise added after 6 months. Kaikkonen et al, [19] found that the intervention group that incorporated exercise at the beginning of the program with the changes had a greater reduction in body weight of 8.5kg versus the control group with 5.5kg weight loss or the group that group that incorporated exercise six months after the lifestyle changes with a weight loss of 4.4kg.

Portion control also plays a factor in weight loss success for individuals in addition to dietary intake. 172 participants with a BMI >25kg/m2 aged 18 to 60 years were surveyed utilizing Likert rating scales to determine food impulsivity. A translated version of the Barratt Impulsiveness Scale (BIS-11) with 30 items to be ranked on participant impulsiveness from 1 (rarely/never) to 4 (almost always/always) was used. A higher score indicated more impulsive behavior. The Power of Food Scale (PFS) was shortened to a 21-item questionnaire to understand the psychological impact of the food and its impact on individuals. The PFS ranks consumption of food items based on pleasurable intake over nutritional needs intake with a Likert scale of 1 (I do not agree at all) to 5 (strongly agree) to examine one’s ability to abstain from pleasurable food consumption. The individuals with more food awareness and portion control were found to be successful with weight loss than those that were more impulsive in the food environment. The results showed that having a better understanding of relationships and behavior with food helped individuals make changes to the way they interacted with food and weight loss success.

**Results and Discussion**

**Characterization of the Body of Literature**

Each article that was chosen from the vast database results was based on the similarities of the proposed intervention to be studied and its similarities to the practice problem that was identified. The literature was reviewed for ease of understanding related to the intervention being utilized and the statistical data and findings. Data was selected that addressed at least one of the interventions included in the problem statement.

The first database searches resulted in thousands of results. Results within the top twenty yielded were reviewed for inclusion. The journals that were selected varied and were not a specific factor in literature inclusion; inclusion was based on appropriateness of the study’s interventions. The database searches limited the journals to English-speaking and peer-reviewed literature. The journals used were all professionally based and peer-reviewed, which increases the reliability of the information provided. The selected journals were of a high quality.

Several articles were included in different database searches with different keywords being used. The repeated articles were of greater relevance within the searches. After numerous searches over many weeks, the articles were narrowed to ones considered to be most closely related to the practice problem and its interventions. The quantitative information was selected over qualitative.

Articles were reviewed briefly for initial inclusion to narrow the article to less than twenty journal articles. The articles were narrowed further after more thorough reviews and readings were completed. The final article selections were studied to have a more advanced understanding of the project and data results.

**Findings Synthesis**

**Behavioral Modifications**

A decrease in caloric intake and/or an increase in physical activity are key factors associated with weight loss success. However, one typically needs to make lifestyle changes or behavioral modifications to adhere to the weight loss plan. Weight loss studies inevitably incorporate an aspect of behavioral modification within any interventions to be reviewed.

Each individual needs to understand their relationship with food. They also need to identify any emotional ties to food that may contribute to unhealthy eating habits or overeating to soothe their emotions and feelings. Once the participant can understand and recognize any unhealthy food relationship, they can begin to develop other coping measures and become less dependent on food as a coping mechanism [19]. Once participants can learn healthy food relationships, they will also learn healthy portion control. [1]. Being successful in understanding one’s relationship and emotional ties to food, she can begin to learn and develop healthier food relationships and make better food choices and follow prescribed diets to lead to weight loss.

Lim et al. [16], utilized an app on smartphones to promote behavioral modifications to determine the impact on weight loss. The participants were provided with dietary and physical activity recommendations from a dietitian face-to-face at the beginning of the study. The intervention group that utilized the smartphone app to track physical activity and diet and to communicate with the dietitian for 6 months versus the control group without use of the app. The intervention groups had weight reduction of 3.1 kg versus 1.2 kg for the control group [16].

Participants may experience unexpected improvements in their quality of life while taking part in the studies and that might increase their motivations to make behavioral or lifestyle changes. Taheri & Irandoust [20] studied improved sleep quality for women following physical exercise. The women report improved sleep quality while also experiencing weight loss versus the women of the control group that did not participate in the exercise group. According to Ryan et al, [8] individuals reported improved quality of life after weight loss success because of the improved health outcomes they experienced. Therefore, a participant may be more motivated to maintain the new diet plans or exercise regimens if they are also experiencing additional health improvements.

**Dietitian Lead Interventions**

The development of specific dietary guidelines to promote a healthy lifestyle and weight loss requires a complex understanding of the dietary system and how nutrients and foods affect the body. Due to the complex nature of the human body and the additional complications that can result from obesity, it is important to follow dietary recommendations from a dietitian or other qualified healthcare provider [21]. Research has shown that the use of dietitian guidance can lead to increased weight loss that participant guided dietary changes. Beleigoli et al. [12], used three groups to monitor weight loss with and without a dietitian lead online support service. One group used an online web platform that offered personalized computer-generated feedback to aid in weight loss. The second group used the same platform but had access to a dietitian to personalized feedback and support. The control group or waitlist group did not receive personalized feedback. They received dietary and exercise recommendations from e-booklets or videos. The groups that received personalized feedback had more success with weight loss than the group without personalized feedback. Another finding was that the groups that used the web-based platforms had a higher consumption of fruits and vegetables while also having a decrease in the consumption of ultra-processed food and sweetened beverages [12].

**Physical Therapist/Fitness Trainer Lead Interventions**

Because many obese individuals have physical limitations, such as joint damage, it is essential to utilize a certified fitness trainer or a physical therapist to assess each participant to determine any physical limitations that may exist and develop an exercise routine that is physically possible for each participant [22]. To gain buy-in from the participants, they must feel that they will be able to participate successfully and can physically complete the program. A trained interdisciplinary team member can formulate an exercise program that the participant can accomplish will increase participant engagement. Jessen-Winge et al. [15], found that participants in their study wanted activities that felt useful and as if they were not a waste of time. By developing the routine that fits into their lifestyle, the participants will be more likely to maintain continued support and possibly lead to lifestyle changes [15].

Nepper et al. [18], addressed the benefits of formulating a workplace weight loss program. The participants were able to support each other and share tips while working. In addition, a fitness center was available to increase one’s participation in physical activity. Participants had an average of 13 pounds of weight loss and an increase in their physical activity and abilities.

A study by Dorling et al. [14], investigated the association between initial weight change and long-term weight changes and compensation (predicted future weight changes) with the use of exercise. According to this study, the individuals with increased initial weight loss had more success with long-term and compensation weight loss than those with less initial weight loss [14].

Berge et al. [23] studied the use High-Intensity Interval Training mixed (HIIT) with moderate-intensity continuous training (MICT) versus MICT only over a 24-week period. Each group was assigned a MICT program of exercise with 3 sessions per week in 8-week intervals. The control group only participated with MICT while the other group utilized HIIT during the second 8-week session. The findings indicated a larger energy expenditure with the HIIT/MICT group versus the MICT only group. The body weight revealed a weight loss of 3.3 kg more with the HIIT/MICT group versus the MICT only group. The waist circumference decrease was also more with the HIIT/MICT group [23].

A study by Taheri & Irandoust [20] investigated if sleep quality was improved with exercise-induced weight loss interventions. The participants were randomly placed in a control group or an intervention group. The exercise interventions consisted of aerobic training 3 days per week for 12 weeks. The results indicated improved sleep with the intervention group versus the control group. The study also revealed that the intervention group had a significant improvement of body weight and body fat percentages [20]

.

**Simultaneous Dietary and Physical Activity Interventions**

The use of dietary change or physical activity can lead to weight loss [24]. The combination of both interventions often leads to more improved weight loss results. According to Leung et al. [17], long-term dietary changes and increased physical activity led to a decrease in body weight of 5.46 kg and BMI of 7.76 % after completing a 10-month lifestyle modification to improve one’s diet and physical activity [17].

Miller et al. [25] conducted a study that had three groups; intensive diet only, intensive exercise only, and intensive diet and exercise combined. This study addresses the individual interventions and then compared them with the use of both simultaneously. Weight loss results were expressed as a percentage loss from the baseline weight. The diet only group had a weight loss of 9.2%, the exercise only group had 1.2% weight loss, and the combination group experienced 9.4% weight loss at the 6-month evaluation [25]. This data indicates that a proper diet may be more effective than exercise alone.

Kaikkonen et al. [19] conducted a study to compare the weight loss changes between a control group, a behavioral modification group, and a behavioral modification and exercise group. The results indicated a greater weight loss from the utilization of behavioral modification and intensive exercise at the beginning of the weight loss program versus behavioral modification alone [19].

**Conclusions and Further Recommendations**

**Implications for Nursing Practice**

The IR revealed that the use of diets that are specifically developed and created for each participant yielded an increase in weight loss versus generic diet and meal plans that did not address the specific needs of the participants. The IR findings showed that generic diets that focus on less calories consumed, and more calories burned do not achieve weight loss success for everyone. The IR showed that participants yielded greater weight loss or a larger decrease in waist circumference when they followed specific diet plans that met their health requirements.

The IR also revealed that individuals were more likely to be compliant and consistent with physical activities when they felt the activity was more congruent with their lifestyle and physical activity abilities. Physical activity is an essential aspect of a successful weight loss program. Individuals that are not in top physical shape tend to be less compliant and fail to continue the physical activity portion of a weight loss program. With physical activity plans that are developed based on the individual abilities of the participants, they are more likely to continue. As they continue the physical activity plans, they will be able to have their plans adjusted to meet their ever-changing abilities.

Based on the findings from the IR, patients will have weight loss with the use of an interdisciplinary planned diet and/or exercise program. Obesity-related health complications often resolve with a modest decrease in body weight, and this can result in improved health outcomes [24]. With weight loss, it can be theorized that individuals may have decreased health complications from many illnesses or conditions that are exacerbated or caused by obesity. With better patient outcomes, the healthcare community could also theorize they will experience fewer hospital readmissions related to obesity and its complications. The healthcare systems will have less of a strain on resources due to the fewer readmissions that could be eliminated or reduced with weight loss. Healthcare providers will see a decrease in office visits also.

Milken Institute School of Public Health [6] addressed the economic burden associated with obesity and its complications. Obesity has direct and indirect costs associated with it. A direct cost is the associated with the medical treatment and care of the obese individual. Indirect costs associated with obesity include other costs that are related to obesity-related issues. Lost wages by the obese patient or caregivers are an indirect cost of obesity. Additionally, increased insurance premiums are another indirect cost. Based on this information, if the incidences of obesity decrease, one can hypothesize the direct and indirect cost of obesity in the world will also decrease.

**Conclusions and Contributions to the Professions of Nursing**

The IR has shown that the combination of proper diet and physical activity will result in greater weight loss success than diet alone. It is important to use a specific diet that is based on one’s nutritional and health needs versus a generic diet plan of limiting specific foods or macronutrients. According to Kaikkonen et al., [19] the weight loss success was greater for those that incorporated exercise with diet changes initially versus the incorporation of exercise training after the dietary changes. Dorling et al, [14] also found more weight loss success with the addition of aerobic exercise when added as an early intervention for those struggling with weight loss success.

The use of dietitian education and support was also found to be successful in weight loss versus no individualized or group support. Beleigoli et al. [12] had greater weight loss success with the use of no coaching system. They found a link to personalized feedback and an increase in weight loss when compared to the weight loss of those not receiving any feedback. Lim et al, [16] also found more weight loss success with the utilization of a smartphone app to track project participation but it also offered dietitian communication for the 6-month period versus those with the communication benefits. These findings are also consistent with the findings from Nepper et al, [18] in which individuals taking part in a workplace support group to achieve weight loss weekly group activities and individual meetings with the nutritionist and health experts.

Based on this information, the use of interdisciplinary guidance to develop appropriate diets and exercise plans for weight loss participants should yield greater success results than the participants following interventions without additional support during the length of the program or by following a generic diet or exercise program.

**Recommendations**

The findings of this IR indicate that nursing education to patients should include the importance of routine physical activity that is physically appropriate for the individual. The individual can typically receive proper recommendations from a personal trainer in a fitness center. An individual is more likely to be compliant with and follow a physical activity routine if it meets their physical abilities and feels relevant to their daily activities. In addition to a personal trainer, the healthcare providers could also offer a list of different exercise options that vary in difficulty and physical ability. The individual can advance themselves as they stay committed to the program and improve their physical health.

In addition, education can include the need to follow specific diets that meet the needs of their health requirements and are designed to aid in weight loss and health improvements. Not every individual can have weight loss success with the same diet plan. Diets need to be individualized to meet the individual’s health and nutrition requirements while also aiding their body to lose weight.

Patient education can also be supplied by the primary healthcare providers and other medical personnel that is assisting with patient care and health improvements. Health education is an important aspect of overall health care and should be addressed by any provider to help reinforce information and allow multiple outlets for information and clarification for the patient or their family members.

**References**

1. [Eykelenboom M, Van Stralen MM, Poelman MP, et al. (2018) Patterns of weight loss and their determinants in a sample of adults with overweight and obesity intending to lose weight. Nutrition & Dietetics 77*:* 240-246.](https://pubmed.ncbi.nlm.nih.gov/30402896/)
2. [Centers for Disease Control and Prevention (2021) Overweight & Obesity.](https://www.cdc.gov/obesity/index.html)
3. [Haregu TN, Lee JT, Oldenburg B, et al. (2020) Comorbid depression and obesity: Correlates and synergistic association with noncommunicable disease among Australian men. Preventing Chronic Disease 17*(E51)*.](https://pubmed.ncbi.nlm.nih.gov/32614771/)
4. [Gregg EW, Shaw JE (2017) Global health effects of overweight and obesity. The New England Journal of Medicine 377: 80-81.](https://www.nejm.org/doi/10.1056/NEJMe1706095)
5. [Tremmel M, Gerdtham U.-G, Nilsson PM, et al. (2017) Economic burden of obesity: A systematic literature review. International Journal of Environmental Research and Public Health 14.](https://pubmed.ncbi.nlm.nih.gov/28422077/)
6. [Milken Institute School of Public Health (2018) The cost of obesity in America.](https://onlinepublichealth.gwu.edu/resources/cost-of-obesity-in-us/)
7. [Clark K (2021) Obesity, overweight patients and opportunities. Chiropractic Economics.](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8094444/)
8. [Ryan DH, Yockey SR (2017) Weight loss and improvement in comorbidity: Differences at 5%, 10%, 15%, and over. Current obesity reports 6: 187-194.](https://link.springer.com/article/10.1007/s13679-017-0262-y)
9. [CDC (2019) Adult obesity prevalence maps. Centers for Disease Control and Prevention.](https://www.cdc.gov/obesity/data/prevalence-maps.html)
10. [Data USA (2018) Rapides Parish, LA.](https://datausa.io/profile/geo/rapides-parish-la)
11. [County Health Rankings (2021) Louisiana. County Health Rankings & Roadmaps.](https://www.countyhealthrankings.org/explore-health-rankings/louisiana/data-and-resources)
12. [Beleigoli A, Andrade AQ, Diniz MD, et al. (2020) Personalized web-based weight loss behavior change program with and without dietitian online coaching for adults with overweight and obesity: Randomized controlled trial. Journal of Medical Internet Research 22.](https://pubmed.ncbi.nlm.nih.gov/33151151/)
13. [Miller GD, Beavers DP, Hamm D, et al. (2017) Nutrient intake during diet-induced weight loss and exercise interventions in a randomized trial in older overweight and obese adults. Journal of Nutrition, Health & Aging 21: 1216-1224.](https://pubmed.ncbi.nlm.nih.gov/29188882/)
14. [Dorling JL, Hochsmann C, Fearnbach SN, et al. (2021) Initial weight change and long-term changes in weight and compensation during supervised exercise training. Medicine & Science in Sports & Exercise 53: 1675-1684.](https://pubmed.ncbi.nlm.nih.gov/33731664/)
15. [Jessen-Winge C, Ilvig PM, Fritz H, et al. (2021) What a weight loss programme should contain if people with obesity were asked-A qualitative analysis within the DO: IT study. BMC Public Health 21.](https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09850-8)
16. [Lim SL, Ong KW, Johal J, et al. (2021) Effect of a smartphone app on weight change and metabolic outcomes in Asian adults with type 2 diabetes: A randomized clinical trial. Journal of the American Medical Association 4.](https://pubmed.ncbi.nlm.nih.gov/34081137/)
17. [Leung AW, Chan RS, Sea MM, et al. (2020) Psychological factors of long-term dietary and physical adherence among Chinese adults with overweight and obesity in a community-based lifestyle modification program: A mixed-method study. Nutrients 12: 1379.](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7284498/)
18. [Nepper MJ, McAtee JR, Chai W (2020) Effect of a workplace weight-loss program for overweight and obese healthcare workers. Quantitative Research 35: 352-361.](https://pubmed.ncbi.nlm.nih.gov/32969262/)
19. [Kaikkonen KM, Saltevo SS, Korpelainen JT, et al. (2018) Effective weight loss and maintenance by intensive start with diet and exercise. Medicine & Science in Sports & Exercise 51: 920-929.](https://pubmed.ncbi.nlm.nih.gov/30531489/)
20. [Taheri M, Irandoust K (2018) The exercise-induced weight loss improves self-reported quality of sleep in obese women with sleep disorders. Sleep and Hypnosis 20: 54-59.](https://www.researchgate.net/publication/312480483_The_Exercise-Induced_Weight_Loss_Improves_Self-Reported_Quality_of_Sleep_in_Obese_Elderly_Women_with_Sleep_Disorders)
21. [Foster D, Sanchez-Collins S, Cheskin LJ (2017) Multidisciplinary team-based obesity treatment in patients with diabetes: Current practices and the state of the science. Spectrum Diabetes Journal 30: 244-249.](https://diabetesjournals.org/spectrum/article/30/4/244/32880/Multidisciplinary-Team-Based-Obesity-Treatment-in)
22. [O'Keeffe M (2016) The importance of the multidisciplinary team for the management of complex obesity in patients with diabetes. Practical Diabetes 33: 253-256.](https://wchh.onlinelibrary.wiley.com/doi/full/10.1002/pdi.2046)
23. [Berge J, Hjelmesaeth J, Hertel JK, et al. (2021) Effect of aerobic exercise intensity on energy expenditure and weight loss in severe obesity-A randomized controlled trial. Obesity Journal 29: 359-369.](https://pubmed.ncbi.nlm.nih.gov/33491314/)
24. [Mayo Clinic (2020) Obesity.](https://www.mayoclinic.org/diseases-conditions/obesity/symptoms-causes/syc-20375742)
25. [Miller GD, Beavers DP, Hamm D, et al. (2017) Nutrient intake during diet-induced weight loss and exercise interventions in a randomized trial in older overweight and obese adults. Journal of Nutrition, Health & Aging 21: 1216-1224.](https://link.springer.com/article/10.1007/s12603-017-0892-5)