

ABSTRACT

Quality of Life Assessment in a Weight Loss Intervention

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This study evaluated whether there was a difference in quality of life scores at the end of an intervention that evaluated the effect of leucine supplementation and calorie-restricted diet over a 12-week period in mid-life overweight and obese women. At baseline and conclusion of this intervention, participants were asked to complete a quality of life questionnaire, “Quality of Life, Enjoyment, and Satisfaction Questionnaire Short Form” (Q-LES-Q-SF) and rank answers from 1-5. Of those participants that successfully lost weight during the intervention, QoL scores improved from an average of 71% to 79%. Our findings show that weight loss and quality of life can be directly associated, and purposeful weight loss can improve overall quality of life.

Quality of Life Assessment in a Weight Loss Intervention

by

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CHAPTER ONE

Background

Obesity in America is an epidemic that is progressively getting worse. Adult obesity rates in five states now exceed 35%, 24 states exceed 30%, and 46 out of 50 states exceed 25%.¹ Chronic disease and obesity are closely related because of the shared associated risk factors. Obesity is a risk factor for type 2 diabetes, respiratory disease, chronic heart failure, and some types of cancer.² Type 2 diabetes is common in an individual that is obese. Adipose tissue releases increased amounts of non-esterified fatty acids, glycerol, hormones, pro-inflammatory cytokines and other factors that are involved in the development of insulin resistance.³ According to the Centers for Disease control (CDC), more than 30 million Americans have diabetes (about 1 in 10), and 90% to 95% of them have type 2 diabetes. Type 2 diabetes most often develops in people over the age of 45, but more children, teens, and young adults are also developing it due to increasing childhood obesity.¹

Another growing problem that people in America are experiencing is the prevalence of mental health disorders. One in five U.S. adults experience mental illness each year. In 2018, 19.1% of U.S. adults experienced mental illness.⁴ Unfortunately, there is no single cause for mental illness.⁵ There could be a number of factors that could contribute to risk for mental illness. These may include, early adverse life experiences such as trauma or history of abuse, chronic medical conditions, biological/genetic factors that could cause chemical imbalances in the brain and use of alcohol or recreational

drugs. However, previous research suggests that obesity may be significantly associated with mental illnesses, specifically mood disorders that include anxiety disorder, bipolar disorder and post-traumatic stress disorder (PTSD).⁶ Thus, having one of these mental health conditions could negatively affect overall Quality of life.⁶

Anxiety and depression have been found to be more closely related to obesity when compared to other mental illnesses.⁶ Several studies have found that the relationship between relative body weight and clinical depression and suicidal tendencies are notably different for men and women. Obesity was associated with an increased risk of depression among females but a decreased risk of depression among males. Among women, obesity was associated with a 37% increase in the probability of being diagnosed with major depression, while for men, obesity was associated with a decrease of similar magnitude.^{6,7} Further research is necessary to understand the exact mechanism for the association between obesity and mental disorders. Possible explanations, specifically for those that are obese and experience depression include the following: brain chemicals involved in both mood and weight gain often overlap.⁸ Hormones involved in metabolism and depression, including stress hormones, might play a role. The stress hormones, including cortisol, the “stress hormone” and leptin, which regulates satiety could possibly be involved. If an individual’s mood state is depressed, there could be an association with inactivity and overeating. This could also lead to “emotional eating” in not only individuals that are experiencing depression, but in those that have anxiety.⁶ Emotional eating is also a key determinant and trigger of bingeing.⁹

Similar to obesity and mental health, the relationship between quality of life and weight status could be correlated. The World Health Organization (WHO) defines

Quality of Life as “an individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.” The WHO divides quality of life into four elements: subjective evaluation, cultural, social, and environmental contexts. As well as assessment of specific life domains such as health, work, family and social relations and leisure activities.¹⁰ A literature review by Kolotkin¹¹ concluded that quality of life is greatly affected by depression.¹² Therefore, if an individual is overweight or obese and experiencing symptoms of a mental illness, their quality of life would most likely be greatly impacted.

Mental health diseases, specifically depression, anxiety and bipolar disorder have a large impact on an individual’s outlook and attitude about life as well as their overall quality of life.¹³ Research was conducted with individuals who had been diagnosed with the above mentioned mental health diseases. Participants completed a “Quality of Life, Enjoyment, and Satisfaction Questionnaire Short Form” (Q-LES-Q-SF) that assessed quality of life and found that these individuals overall had low quality of life scores. The results were directly associated with the diseases that these individuals had been diagnosed with.¹³

The Q-LES-Q-SF form is a self-reported tool to assess quality of life by measuring an individual’s satisfaction and enjoyment in different areas of daily functioning.¹⁴ The original scale consists of 93 questions, however, this abbreviated “SF” (short form) version consists of 14 items derived from the long form’s general activities subscale. It also includes two questions about medication and overall life satisfaction.

In a weight loss intervention, quality of life was measured via the Q-LES-Q-SF in participants who were overweight and had type 2 diabetics and trying to lose weight by exercising regularly. ¹⁵ Most of the (52%) participants at baseline were determined to have a low quality of life score at the beginning of the intervention. When asked why, their responses were generally related to negative feelings about their appearance or inability to complete daily tasks without experiencing shortness of breath. At the end of the 6-month intervention, the average weight loss for participants was approximately 15 pounds. Participants who were compliant to the exercise prescription and lost weight had improvement in their quality of life score. The subjects that were not compliant with exercise did not lose weight, did not have improvement in scores. These findings imply that individuals that lose weight, should or may experience an improved quality of life as measured by the Q-LES-Q-SF.

Purpose

Does weight loss improve quality of life? The purpose of this study was to determine whether quality of life scores would be improved in mid-life women whose weight decreased as a result of participating in the weight loss intervention.

Objective

Determine whether there is a difference in quality of life scores associated with weight loss.

CHAPTER TWO

Materials and Methods

Selection and Recruitment

Participants were women ranging from 40-65 years old living in central Texas. Inclusion criteria included healthy women who had a body mass index (BMI) above 26 and were interested in following a prescribed weight loss diet. Participants were also required to read and understand English. Participants were excluded from the study if they had: hepatorenal disease, musculoskeletal disorders, sclerosis, cancer or anemia, type 1 diabetes, were pregnant, or had a BMI below 26. The study was approved by the IRB for Human Subjects. After participants passed the screening, procedures, risk and benefits were explained via a consent form, and questions were addressed. Once the consent form was signed, study procedures began.

Design and Methods

This was a randomized trial conducted to determine the efficacy of the amino acid supplement leucine's impact on maintenance of lean mass during purposeful weight loss. Participants were randomized to receive either 5.0 grams of leucine/two times per day or 5.0 grams of placebo (apple pectin) along with both groups being prescribed a low-

calorie diet. All participants completed a quality of life pre and posttest survey as a sub-study within this research project, with main study findings published elsewhere.¹⁶ Randomization was accomplished with every other participant enrolled receiving the supplement. Subjects completed baseline and end of study assessments that included anthropometric measurements of height, weight and waist circumference. Resting metabolic rate was obtained using a hand-held BodyGem® indirect calorimeter. Body composition was measured using a Dual-energy x-ray absorptiometry bone densitometer (DXA). Diet history was obtained to determine the approximate kcal level that participants were currently consuming. The diets were calibrated to induce a 400 to 500 kcal/day energy deficit and was written to include 1.2 grams of protein per kg body weight. Participants completed a 3-day diet and physical activity record at week 1, week 6 and at the end of the intervention to assess compliance. They were instructed to follow their prescribed diet and to engage in light to moderate physical activity for 30-45 minutes per session (3-5 days per week). Lastly, participants completed a validated QOL survey (appendix) entitled, “Q-LES-Q-SF” (Quality of Life Enjoyment and Satisfaction Questionnaire Short Form) at baseline and end of the study.¹⁷ The participants responded to the survey questions via a five-point Likert scale that first asked, “Taking everything into consideration, during the past week how satisfied have you been with your....” To which then they would circle one of the following options, (“very poor”, “poor”, “fair”, “good”, and “very good”). There are two questions at the end of the survey that ask about medications as well as satisfaction with overall life during the past week. These two questions are considered independently when totaling the QOL score.

Statistics

Ordinal data were used from the Q-LES-Q-SF questionnaires that were completed at baseline and end of the study. There were 44 participants who began the study with 34 completing the 12-week intervention. The 34 participants completed the questionnaire both times. Statistical software, JMP was used to analyze and interpret data. The first 14 variables included in the Q-LES-Q-SF were used to calculate a total quality of life score. In order to calculate the QOL score, the questionnaire minimum score of 14 was subtracted from the participant's total score, which was then divided by a denominator of 70 (70 being the minimum score of 14 subtracted by the maximum possible raw score). A Wilcoxon Signed Rank test was conducted when analyzing individual variables within the Q-LES-Q-SF. A paired t test was conducted when analyzing the Q-LES-Q-SF score difference before and after testing. Significance level was set at $p \leq 0.05$.

CHAPTER THREE

Results

Participants

Of the 44 participants who began the study, 34 (n=34) completed the 12-week intervention. Participants were highly compliant with the supplement protocol; however, dietary and exercise compliance was low. The Q-LES-Q-SF (included in Appendix) was completed at baseline and at the end of the 12 weeks by all 34 participants. Baseline characteristics and demographics are presented in Table 1.

Table 1. Demographics

Characteristic	Placebo (n = 18)	Supplement (n=16)
Age	51.83 ± 1.70	51.19 ± 1.60
Height (cm)	163.9 ± 1.66	164.9 ± 1.69
Weight (kg)	83.27 ± 4.11	83.46 ± 2.78
BMI	30.87 ± 1.23	30.70 ± 0.96
Body fat (%)	40.68 ± 4.33	40.08 ± 3.98
Lean mass (kg)	47.09 ± 1.90	47.88 ± 1.59
Fat mass (kg)	34.17 ± 2.22	33.58 ± 1.62
Waist girth (cm)	94.04 ± 2.69	97.70 ± 2.90
Resting Metabolic Rate (kcal/day)	1,402.22 ± 74.05	1,388.75 ± 41.48
Avg. Activity (min/week)	34.48 ± 6.47	25.94 ± 8.20

Participants were asked to answer 16 questions that were included in the Q-LES-Q-SF and respond using a 5-point satisfaction scale (1 being very poor, 5 being very good). Differences in scores before and after were compared. Answers from the first 14 questions create the total Q-LES-Q-SF score. The last two items, about medications and overall life satisfaction, are considered independently and were not evaluated in this project. Differences in scores before and after were compared. Higher scores indicate better enjoyment and satisfaction with life.

Weight Status

Out of the 34 participants, 28 individuals lost weight throughout the intervention. The twelve-week intervention resulted in a loss in body mass for both groups (Placebo = -2.87 ± 0.68 kg, Leucine = -2.10 ± 0.60 kg). The difference in weight loss was not statistically significant between the two intervention groups. Compliance to dietary and exercise prescriptions was poor. Food logs indicated 10% fewer calories were consumed than prescribed with the average intake at $1,229 \text{ kcal} \pm 29.8$ per day. Weekly exercise was well below the recommendation of >150 minutes per week with average exercise being $47.45 \text{ minutes} \pm 7.35$ per week. Five individuals gained weight and one participant maintained the same weight throughout the intervention. Weight loss totals are presented in Figure 1.

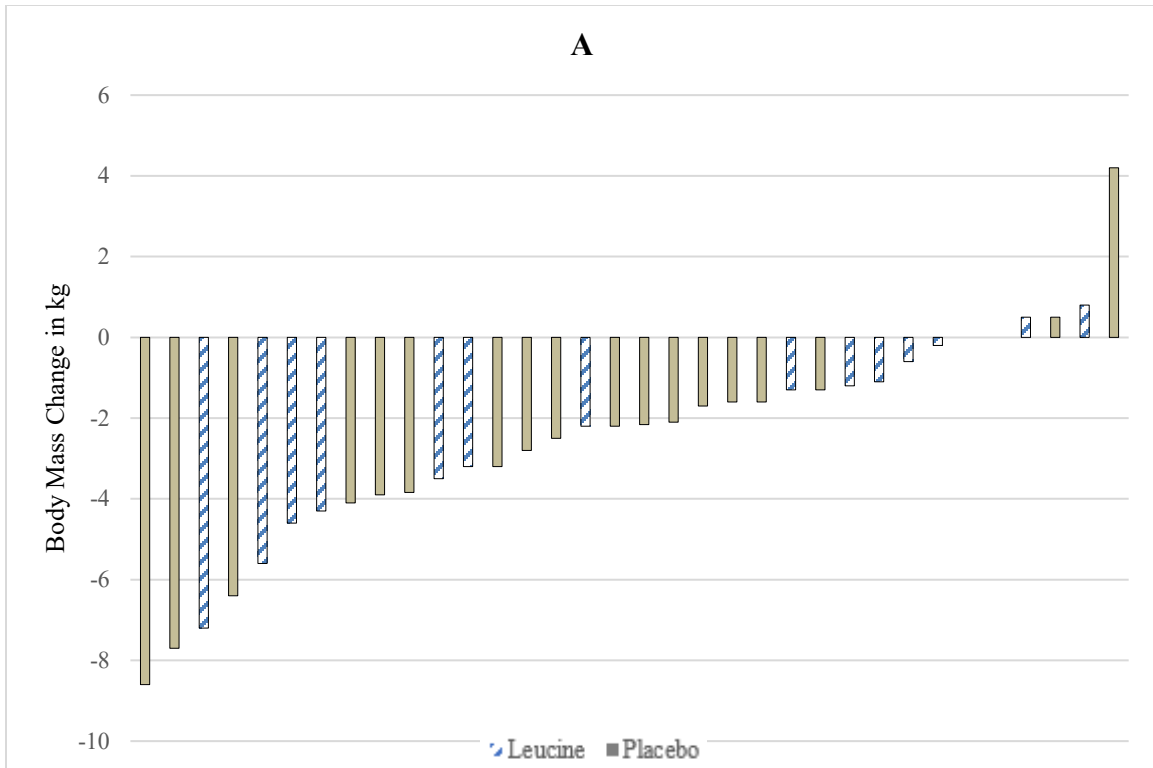


Figure 1. Weight Loss

Mean QOL scores per weight status group are presented in Table 3. The lowest possible score that participants could receive was a 14, which would represent answering all questions with a “1”. The highest possible score from the questionnaire was a 70, meaning the participants answered with a “5” for all questions. Overall, participants that lost weight had improved QOL scores by 5.35%. The participant who maintained the same weight throughout the study also had an improved QOL score. Participants that gained weight during the study had lower QOL of scores at study end. Of note, one participant that gained weight, had a QOL score that improved. When comparing the score difference among participants using the paired t-test, the improvement overall was statistically significant. (p-value of 0.0006).

Table 2. Mean Quality of Life Scores by Group

Group	Baseline Score Mean (SD)	Study End Score Mean	P-Value
Lost Weight (n=28)	53.32% (0.16)	58.67% (0.12)	0.0002
Gained Weight (n=5)	54.20% (0.14)	51.40% (0.18)	0.6132
Weight did not change (n=1)	63.0%	68.0%	0.4181

Individual questionnaire parameter scores for all participants are shown in Table 4. Within the different parameters included on the questionnaire overall, all individual parameter scores improved. Seven out of the fourteen parameters were statistically significant with p-values listed below. Parameters of physical health, social relationships, sexual drive, interest, and/or performance, economic status, and sense of well-being were the most statistically significant out of those seven.

Table 3. Individual Parameter Scores

Items	Value		P-Value
	Baseline	After	
1. Physical Health	3.36	3.88	0.0152
2. Mood	3.48	3.94	0.0019
3. Work	4.02	4.12	0.1963
4. Household Activities	3.68	4.06	0.664
5. Social Relationships	3.95	4.24	0.0127
6. Family Relationships	4.25	4.26	0.2604
7. Leisure Time Activities	3.61	3.97	0.232
8. Ability to function in daily life	4.16	4.29	0.918
9. Sexual Drive. Interest and/or performance	2.98	3.5	0.0005
10. Economic Status	3.82	4.18	<0.0001
11. Living/Housing Situation	4.39	4.44	0.2439
12. Ability to get around physically without feeling dizzy or falling	4.43	4.62	0.0679
13. Your vision in terms of ability to work or hobbies	4.14	4.29	0.0449
14. Overall sense of well being	3.93	4.21	0.0008

Score difference between groups is shown in Figure 2. Total baseline and follow-up mean scores were included to calculate this difference. Shown in this figure, 75% of respondents had a percentage change in QOL score of less than 12.5% and 25% of respondents had a percentage change in QOL score more than 12.5%. Also shown in the figure, most of the plot is above zero, which shows scores that improved.

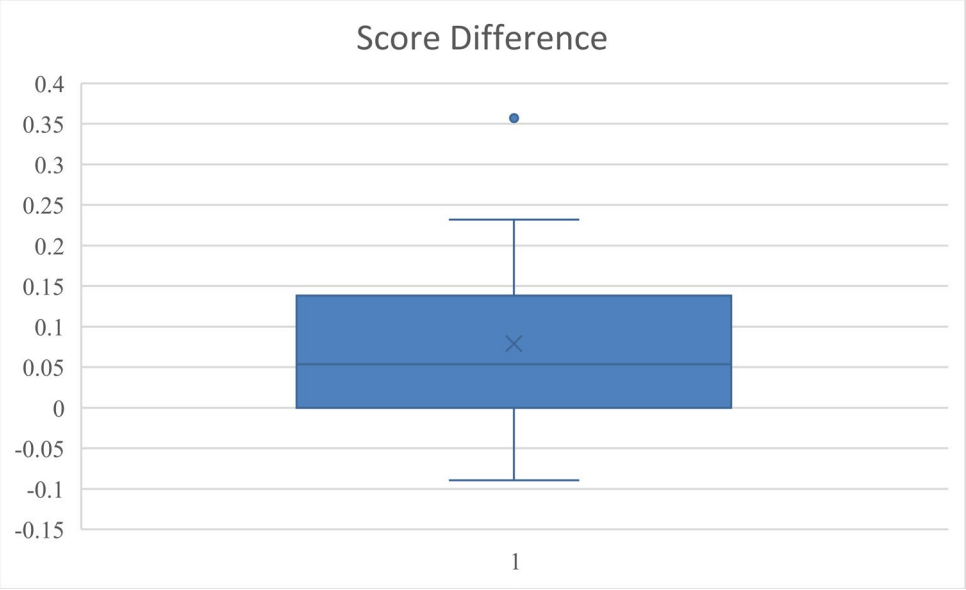


Figure 2: Score Difference

CHAPTER FOUR

Discussion

This sub-study evaluated whether QOL would improve over a 12-week period in mid-life overweight and obese women participating in a weight loss study. Our results suggest that weight loss and quality of life can be directly associated. The 28 participants that lost weight during the intervention all had improved QOL scores.

Given that the QOL score encompasses many areas of health and daily living, this improvement in score suggests that purposeful weight loss can have a positive impact on overall health.

Knowing the relationship between mental health and QOL, it can be concluded that an individual's mental health may significantly improve if there is an improvement in QOL score. Questions included in the Q-LES-Q-SF that relate to mental health status ask how participants have been satisfied with their mood, ability to function in daily life as well as overall sense of well-being. Previous research supports that these three parameters impact an individual's mental health status.^{5,17}

It is important to note that in this sample, all individual parameter QOL scores increased from baseline to study end. Both the parameter of physical health as well as mood improvement was statistically significant. If weight loss improves physical health and mood, this could promote willingness to exercise and willingness to improve nutritional intake.¹⁸ An individual that experiences an improved mood because of weight loss is more likely to continue their exercise regimen.¹⁹

The social relationship parameter also showed improvement as weight loss could improve an individual's confidence. Whereas someone that is overweight or obese may lack confidence or be negatively stereotyped based on their weight, making it harder to form or maintain relationships.⁶

Another noteworthy parameter that improved was questioned the "ability to get around physically without feeling dizzy or unsteady or falling". Weight loss could improve mobility, thus decreasing symptoms of feeling unsteady and having frequent falls.²⁰ This may then promote an increased physical activity routine for someone that has experienced improved mobility.

Although all parameters overall showed improvement, there were a select few individuals, however, that did answer with a lower rating at the end of the intervention compared to their rating at baseline. This was not common enough to lower the overall results of an increase in each parameter. Individuals selecting a lower rating compared to their baseline rating did so in the physical health, work, economic status and living situation parameters. Participants who did select a lower rating in these parameters were all had gained weight at the end of the intervention.

There were a few study limitations, which may have influenced the QOL score outcome. The first being non-compliance to diet and exercise prescriptions. If these were followed more closely, overall weight loss may have been greater, which may have improved QOL scores in total. There were several incomplete questionnaires submitted by participants. A few participants did not circle an answer for every question on the questionnaire. This however was not common enough to skew the overall results. Other

factors such as sleep quality or quantity, work or personal stress levels, etc. can play a role in how participants respond to a survey.

CHAPTER FIVE

Conclusion

The use of the Q-LES-Q-SF in this study indicated that it can be an appropriate questionnaire to use to assess QOL in participants enrolled in a weight loss intervention. Results show that weight loss over this 12-week study period significantly improved QOL and that weight gain negatively impacted QOL. The variety of life aspects that were encompassed in the Q-LES-Q-SF that all improved in participants that lost weight is noteworthy. This indicates that weight loss, especially in mid-life women, can positively impact many components of daily living. Although all parameters of the Q-LES-Q-SF increased, there were three parameters (physical health, economic status and sexual drive/interest/performance) that interestingly increased more than others and were statistically significant. (p-values of 0.0152, <0.0001, 0.0005.) Further research should be done to evaluate how weight loss specifically impacts both willingness to engage physical activity and sexual drive/interest/performance.

APPENDIX

APPENDIX

Q-LES-Q-SF Survey

**Quality of Life Enjoyment and Satisfaction Questionnaire – Short Form
(Q-LES-Q-SF)**

	Very Poor	Poor	Fair	Good	Very Good
.....physical health?	1	2	3	4	5
.....mood?	1	2	3	4	5
.....work?	1	2	3	4	5
.....household activities?	1	2	3	4	5
.....social relationships?	1	2	3	4	5
.....family relationships?	1	2	3	4	5
.....leisure time activities?	1	2	3	4	5
.....ability to function in daily life?	1	2	3	4	5
.....sexual drive, interest and/or performance?*	1	2	3	4	5
.....economic status?	1	2	3	4	5
.....living/housing situation?*	1	2	3	4	5
.....ability to get around physically without feeling dizzy or unsteady or falling?*	1	2	3	4	5
.....your vision in terms of ability to do work or hobbies?*	1	2	3	4	5
.....overall sense of well being?	1	2	3	4	5
.....medication? (If not taking any, check here and leave item blank.)	1	2	3	4	5
.....How would you rate your overall life satisfaction and contentment during the past week?	1	2	3	4	5

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