

An Analysis of the Weight Watchers and Atkins Diets: The Effects of
Calorie Restriction and Nutrition Levels

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Abstract

The purpose of this study was to determine the effectiveness of a calorie-restricted diet versus one with restricted food groups. To accomplish this, a survey with 19 participants, age ranging from 25 to 74 years, was taken for people who attempted Weight Watchers, a calorie-restricted diet, and Atkins, a low-carbohydrate diet. The success rates of each of these diets will be compared and analyzed in this study. Participants reported short-term and long-term weight loss results. For the data analysis, descriptive statistics and two independent *t*-tests were performed. For short-term weight loss on Atkins, $M = 20.25$, and on Weight Watchers, $M = 44.33$. With net weight loss, Atkins averaged 11.25 pounds and Weight Watchers group averaged 44.33 pounds. Although the independent *t*-tests did not show a significant difference, research suggests that calorie restriction is more effective for long-term maintenance.

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The obesity epidemic is a pressing issue in the United States today. According to the Centers for Disease Control and Prevention, over 35% percent of the population is considered overweight. In addition, 27.2% of the population is categorized as obese, meaning that almost two thirds of the country is classified as above normal weight (Sharpe, 2013). Conditions relating to obesity, which are the leading causes of preventable death, include heart disease, type 2 diabetes, stroke, and certain types of cancer (Centers for Disease Control and Prevention, 2013).

In today's society, even with all of the medical advancements and nutrition information available, many people struggle with health issues due to their weight. For overweight and obese individuals, even a small amount of weight loss can lead to large improvements in overall health and quality of life, and reduce the risks for diseases such as diabetes and heart disease (Morgan et al., 2009). New techniques and diets to lose weight or extend quality of life are constantly being promoted. In addition to the struggle to take the weight off is the struggle to keep it off for a long duration of time. Long-term weight loss after completion of a diet program has been difficult due to conditions of the diet or the habits of participants while on the diets. Some of the different methods to produce weight loss include calorie restriction and low-carbohydrate diets. Calorie restriction without malnutrition has shown itself effective in weight loss, and the most popular diet including this technique is the Weight Watchers diet. The best-known

example of a low-carbohydrate diet is the Atkins diet. The success rates of each of these diets will be compared and analyzed in this study.

Calorie Restriction

A helpful strategy for looking at a successful diet with calorie restriction is to consider the number of calories per pound and calculate how many calories should be restricted for weight loss. There are approximately 3,500 calories in one pound of fat, so someone who wants to lose one pound in a week would have to cut 500 calories out of his or her diet per day. The resting metabolic rate, or the number of calories that the body burns in a day while resting, should also be calculated to make sure that the diet is not overly restricted (Jennings & Lesser, 2012). Calorie restriction is effective in weight loss because it promotes the retention of lean mass and increases lipolysis, which is the breakdown of fat into energy (Varady, 2011).

The production of weight loss requires a negative energy balance. The only way that a negative energy balance can be achieved is by either decreasing energy intake or increasing energy expenditure. A relatively easy way to measure energy intake and expenditure is through calorie counting and observation. Calorie restriction and increased physical activity are best for successful weight loss programs. Research studies consistently show people who successfully maintain their weight loss change both their intake and expenditure levels in order to lose and maintain weight loss (Wing & Hill, 2001).

Weight Watchers

Weight Watchers is one of the best known calorie-restricted diets in the United States. Also, Weight Watchers is probably the best example of a successful diet

including calorie restriction. The diet works on a point system, which is determined by the participant's current weight and height. Each food is assigned a value based on energy, fat, and fiber content per serving. Fiber decreases the point value assigned to a particular food, whereas fat and energy levels increase the point value. No foods are strictly off limits, but dieters are encouraged to maximize their points by choosing nutrient-dense foods such as whole grains, lean meats, low-fat dairy, and unlimited quantities of fresh fruit and nonstarchy vegetables. Dieters are allowed more points per day for increased activity levels so as to encourage regular activity (Remedy Health Media, 2009). A study conducted in the United Kingdom by the National Health Service looked at the weight loss rates of thousands of participants in Weight Watchers. These participants received twelve free vouchers enabling them to attend Weight Watchers meetings for a twelve-week study. One third of all people who were referred to Weight Watchers had a weight loss of over five percent of their initial body weight, which is enough for significant clinical benefits (Ahern, Olson, Aston & Jebb, 2011).

Dietary Claims

Weight Watchers claims that its participants will lose between one and two pounds per week. This amount of weight loss is within the healthy recommended range for a one-week time frame, meaning it would be an effective diet for long-term maintenance (Centers for Disease Control and Prevention, 2013). Weight Watchers encourages dieters to track their own calories and physical activity, making people more aware of their food and exercise habits. Of the people using the Weight Watchers diet, 68% recorded what they ate through the weight, food, and exercise trackers provided on

the website. The typical weight loss seen in a nine-month period was 12 to 35 pounds in men and 10 to 28 pounds in women (Lose weight your way, 2013).

Dietary Quality

When comparing to other leading commercial diets, Weight Watchers fared well with a high score on the Alternative Health Eating Index (AHEI), which measures dietary components strongly linked to cardiovascular disease risk reduction. The nine components of AHEI are fruit, vegetables, nuts and soy, ratio of white to red meat, cereal fiber, trans fat, ratio of polyunsaturated fat to saturated fat, alcohol, and duration of multivitamin use. Weight Watchers had all these components, which led to an increased capacity for cardiovascular disease prevention. Thus, Weight Watchers would be classified as having a high dietary quality (Ma et al., 2007). In studies on weight loss maintenance, the majority of people who maintained their weight loss reported that they ate less and restricted their intake of both high-fat and high-sugar foods (Shick, Wing, Klem, McGuire, Hill & Seagle, 1998). Therefore, Weight Watchers is structured for success with eating habits that can be maintained long-term.

Atkins

Another popular diet in the United States is the Atkins diet. The diet has been around for about fifty years, but it was revised in 2010. The theory behind Atkins is that when carbohydrate intake is drastically cut back, the body will turn to fat as a fuel source, putting the body in a fat-burning zone. The result that follows from this process is the by-product ketone, which is used for energy (Diwan, 2007). Calorie counting and portion control are not required on the Atkins diet, but dieters must track their carbohydrate intake. One statement Atkins makes is that eating a low amount of carbohydrates will

burn the body's fat stores, regulate blood sugar, and satisfy the appetite while leading you to optimal health (Mayo Clinic Staff, 2012). Eating a low-carbohydrate diet will lead to normal blood sugar levels, and thus normal insulin levels. This allows your body to burn fat (Atkins International, 2014).

Phases of Atkins

The first phase of Atkins, known as the induction phase, limits your carbohydrates to no more than 20 grams per day. In this phase, dieters may not eat pasta, bread, fruit, starchy vegetables, nuts, seeds, legumes, or caffeine. As the phases progress, participants slowly add more vegetables and other low-carbohydrate grains. For the maintenance program with Atkins, dieters are allowed to slowly add in more carbohydrates as time passes to make the diet easier to follow. Cutting out whole food groups, especially carbohydrates, puts great limitations on your eating options, making it difficult to follow long term. The diet may be low in fiber, calcium, magnesium, and potassium as well (Atkins International, 2014).

Dietary Claims

The Atkins diet claims to be effective in weight loss even though participants can consume fatty meat, butter, and other high-fat dairy products, with a limitation on carbohydrate intake. The assertion of the diet is that participants can lose fifteen pounds in the first two weeks of phase one (Mayo Clinic Staff, 2012). A systematic review of low-carbohydrate diets found that the weight loss achieved is associated with the length of the diet and regulation of energy intake, not with the restriction of carbohydrates (Astrup, Larsen & Harper, 2004). During severe carbohydrate restriction, the body's stores of glycogen and water are depleted, so weight loss could be attributed to fluid

rather than fat loss. Atkins claims that weight lost on the diet is because of increased energy expenditure, but there is currently no evidence that high-fat and high-protein diets are heat producing. Fat has a low thermogenic effect, which cannot account for more than a small percentage of the observed weight loss (Astrup, Larsen & Harper, 2004). However, studies have shown that low-carbohydrate diets can be just as effective for weight loss as calorie restriction and can even improve cholesterol and triglyceride levels.

Weight Loss Comparison

One yearlong study of overweight or obese individuals with known hypertension or hyperglycemia compared four popular diets, including both Atkins and Weight Watchers. Each diet reduced body weight and cardiac risk factors by the conclusion of the year. Each diet also resulted in a reduced ratio between low-density lipoprotein and high-density lipoprotein cholesterol by around ten percent (Dansinger, Gleason, Griffith, Selker & Schaefer, 2005). Low-carbohydrate, high-animal protein diets such as Atkins, have been shown to produce greater reductions in low-density lipoprotein concentrations than high-carbohydrate diets (Jenkins et al., 2009). Comparing weight loss averages for all participants after one year, more weight was lost on Weight Watchers than on the Atkins diet (Dansinger et al., 2005).

In another study comparing popular diets, weight loss was highest in the Atkins group during the first four weeks. From then on, weight loss among the four groups did not differ significantly. However, after one year, more participants in Atkins had regained a majority of the weight than those in Weight Watchers (Marton, 2006). According to the Atkins diet, exercise is not essential for weight loss. This could be a reason for regaining the lost weight over time for a large percentage of participants

(Mayo Clinic Staff, 2012). Without proper, healthy habits established during the diet, participants are more likely to return to their original baseline weight.

Long-Term Weight Loss

Long-term maintenance of weight loss is a struggle for many overweight Americans. Participants in behavioral weight-loss programs are estimated to lose approximately 10% of their body weight over a 20 to 24 week period. However, within one year of that time, participants regained an average of one third of their weight lost and returned to their original baseline weight within five years (Shick et al., 1998). When it comes to long-term weight loss, there were certain characteristics and behaviors discovered leading to improved success. In a study of men and women who had successfully maintained a weight loss of at least 13.6 kg for five years, dietary habits were reported and compared. During the maintenance phase where the dietary program has ended and consistency in weight is desired, the common strategies used included limiting the quantity of food eaten, limiting the percentage of energy from fat, counting calories, and counting grams of fat. Subjects also expended a large number of calories every week through physical activity (Klem, Wing, McGuire, Seagle & Hill, 1997).

The National Weight Control Registry did a survey of their members who successfully maintained their weight loss and found certain trends. Members reported engaging in high levels of physical activity, eating a diet low in calories and fat, eating breakfast regularly, self-monitoring weight, and maintaining consistent eating patterns (Wing & Phelan, 2005). Studies have shown that the best predictors of successful long-term weight loss maintenance are adoption of a low-fat, calorie-restricted diet and continued exercise. Therefore, efforts to improve weight maintenance after completion

of a program should focus on increasing exercise along with the diet component of a treatment program (Shick et al., 1998).

When weight loss of 5 to 10% of initial body weight is achieved for those classified as overweight or obese, there are significant improvements in risk factors to health, such as heart disease and diabetes. A 5% weight loss can also reduce or eliminate the need for medications for these chronic problems. If the goal of a diet program is to increase overall health, achieving a weight loss of ten percent and maintaining that loss should be considered successful for reducing disease risk. Thus, successful weight loss in the long-term can be defined as achieving a weight loss of at least ten percent of baseline body weight and maintaining this weight loss for at least 12 months (Wing & Hill, 2001).

The aim of this current study was not only to determine successful weight loss of participants while following the Weight Watchers and Atkins diets, but to also gather the long-term weight loss results. Calorie restriction without limitations on food groups should be more effective in the long term than the low-carbohydrate diet due to the common trends previously discussed among successful dieters during the maintenance stage. The purpose of this study is to determine the effectiveness of a calorie-restricted diet without malnutrition versus one with restricted food groups. Looking at short-term and long-term weight loss data will determine which diet is more successful and efficient for producing a healthy lifestyle and the resulting reduction of weight-loss related diseases and disorders.

Method

Participants

Participants in this survey were required to have committed to Weight Watchers or the Atkins diet in the past, or to be currently on one of the diet plans. The research study consisted of 19 participants total. These participants were asked to fill out the survey to the best of their ability, since some of them may have been on these diets longer than others. Fifteen of those participants had taken part in the Weight Watchers program, and four of them utilized the Atkins diet. Preliminary questions in the survey asked about the participant's age, gender, and race for statistical and grouping purposes. The age range for the participants was from 25 to 74 years. Thirty-six percent were between the ages of 45 and 54. Age ranges 25 to 34 and 55 to 64 each had 26% of the participants, and age ranges 35 to 44 and 65 to 74 each had 5%. Eighteen of the participants were female, with only one male participant. All of the participants who chose to select their race in the survey questions identified themselves as white.

Materials

The mechanism for collecting data in this study was an online survey sent out to participants through various means. The leader of a Weight Watchers support group was contacted through email to receive further contact information for diet participants. For the Atkins group, the researcher had previously collected contact information for multiple participants, and other dieters were found through various popular social media sites, such as Facebook and Twitter. All information on the survey was anonymous due to the possible sensitive nature of questions about weight. IBM's statistical program SPSS, was used to collect data and was later used to analyze data trends and significance.

Procedure

Informed consent. As previously stated, data were collected through an online survey. To begin the survey, participants were informed of what to expect as they answered the questions. The purpose of the research study, which was to determine the success rates with short-term and long-term weight loss between Weight Watchers and Atkins, was the first statement within the informed consent. Risks and benefits of taking the survey, however minimal, were included in this section as well. Participants were reminded that participation in the survey was voluntary and that there would be no monetary compensation. Procedure for confidentiality of information was also explained. Records of all data are stored on the researcher's personal computer with password protection. Lastly, contact information for the researcher and faculty advisor were provided for further questions, along with the exemption number from the Institutional Review Board.

Survey questions. Once participants had passed completed the informed consent section, they answered preliminary questions about age, gender and race. They then chose to answer the survey for either the Weight Watchers or Atkins diet, depending on what they had followed. The main questions for data collection started with a question on how much time was spent on the diet. Next was a question about the amount of weight loss on their diet, and then how much weight was regained after six months off the diet. Participants had the option to leave this section blank if they were still following the diet plan currently.

Data collection. Data from each participant's answers was stored online through the survey program and were later recorded on an SPSS document by the researcher.

Data were divided into categories by diet. From there, data were further divided into short-term and long-term categories, along with dietary adherence and amount of weight regained. Weight lost during the diet and net weight loss after weight regain were selected for data analysis (see Table 1). The independent variables for this study are which diet the participants followed, either the Weight Watchers program or the Atkins diet. The dependent variable for the first analysis of short-term weight loss was the amount of weight lost while on the diet. The second dependent variable for analysis of long-term weight loss was net weight loss after factoring in the weight regained after six months off the diet. For participants who were still currently on the diet, net weight loss was entered as the same as short-term weight loss, which may have led to slightly different results.

Results

The purpose of this study was to determine the effectiveness of a calorie-restricted diet without malnutrition versus a low-carbohydrate diet with restricted food groups. The hypothesis was that calorie restriction without malnutrition, the Weight Watchers program, would be the more successful diet for long-term weight loss. Diet adherence levels among participants were also predicted to be higher among the Weight Watchers group. The study consisted of fifteen participants for Weight Watchers and only four participants for Atkins. The data can still be compared with validity even with the difference in participant numbers if the analysis takes this into account. In an ideal study, more participants could have been collected for the Atkins group.

For the data analysis, descriptive statistics and two independent *t*-tests were performed. The mean (*M*), or average, of the data was taken, as well as the median for

time spent on the diet. These descriptive statistics provide a mathematical summary of performance. *T*-tests are used to examine a difference in a continuous variable among two and only two groups. The independent *t*-test is specifically used to examine the difference in one continuous dependent variable between two independent groups. For the two independent *t*-tests performed, the two independent groups were the Weight Watchers and Atkins diets, and the dependent variables were weight lost on the diet and net weight loss. The data collected for the Weight Watchers participants is found in Table 1, and the data collected for all of the Atkins participants can be found in Table 2.

Diet Adherence

The first statistic useful to discuss is the amount of time spent on the diet in both groups. The average time spent on the Atkins diet among the four participants was 216 days. The range for diet adherence in Atkins was from 14 to 730 days. The large range of data for Atkins makes the median a better measure of diet adherence. Taking out the outlying answers to avoid skewing the central tendency, the median time spent on Atkins was 60 days. For Weight Watchers, the average time of diet adherence was 247 days, and without the outliers, the median was still 240 days. The range for diet adherence on Weight Watchers was from 40 to 500 days.

Short-term Weight Loss

To compare the weight loss rates on both diets, the average of all participants was taken and an independent *t*-Test was performed to determine significance (sig.). For the Atkins group, mean weight loss while on the diet was 20.25 pounds with a standard deviation (*s*) of 12.527 pounds. Weight loss ranged from six to 35 pounds in this diet group. Mean weight loss on the Weight Watchers program reached 44.33 pounds, where

Table 1

Collected Data; Weight Watchers

Time on Diet (Days)	Weight Loss (lbs)	Weight Regained (lbs)	Net Weight Loss (lbs)
180	25	10	-15
365	14	18	4
365	70	0	-70
60	7	0	-7
510	105	0	-105
40	5	10	5
240	40	10	-30
90	10	10	0
500	135	0	-135
365	58	0	-58
120	15	20	5
360	30	0	-30
240	70	30	-40
180	55	55	0
90	10	10	0

Table 2

Collected Data; Atkins Diet

Time on Diet (Days)	Weight Loss (lbs)	Weight Regained (lbs)	Net Weight Loss (lbs)
730	35	15	-20
30	6	6	0
90	15	10	-5
14	25	5	-20

$s = 38.129$ pounds. The range for Weight Watchers short-term weight loss while on the diet was from five to 135 pounds. The independent t -test for this group was run on the SPSS program. The variances of both groups were assumed to be equal, and this was tested using Levene's Test of Equality of Variances. The test did not return a significant value, meaning that the variances are assumed to be equal, disqualifying the second set of data in the charts. For the difference between weight lost in the Atkins versus the loss on

Weight Watchers diet to be significant, the alpha level for comparison should be less than 5% ($p < 0.05$). The analysis showed that weight lost with Weight Watchers was not significantly different from weight lost with Atkins, $t(17) = 1.223$, $p > 0.05$. The standard error estimate for the data was calculated to be 19.695. Results of the independent t -test for short-term weight loss are summarized in Table 3.

Weight Regained

The weight that was regained within six months of cessation of the dietary program was factored in to determine the net weight loss of participants. The average weight regained after the Atkins diet was nine pounds, $s = 4.546$ pounds. The range of weight regained on Atkins was from five to 15 pounds. For Weight Watchers, the mean weight gain after six months was 12.6 pounds, $s = 15.454$ pounds. The range on Weight Watchers for weight gain after six months started at zero and went up to 55 pounds. Dietary adherence and amount of short-term weight loss were factors when determining these numbers.

Long-term Weight Loss

To compare the net weight loss of the diets, both the average of long-term weight loss for all participants and an independent t -Test were taken to determine the significance of the relationship. Long-term weight loss, or net weight loss, was found by subtracting the weight regained after six months from the weight lost while participating on the diet. The average net weight loss for the Atkins diet was 11.25 pounds, $s = 10.308$ pounds. The range of data collected for long-term weight loss on Atkins varied from zero to 20 pounds. Mean long-term weight loss for the Weight Watchers program among the 15 participants was 31.73 pounds, $s = 43.218$ pounds. The range for Weight Watchers

Table 3

Independent Samples Test for Short-term Weight Loss

	Levene's Test for Equality of Means		<i>t</i> -Test for Equality of Means				
	F	Sig.	<i>t</i>	df	Sig. (2-tailed)	Mean Difference	Standard Error Dif.
Equal variances assumed	3.371	0.084	1.223	17	0.238	24.083	19.695
Equal variances not assumed			2.064	15.657	0.056	24.083	11.668

long-term weight loss was from zero to 135 pounds. Two Weight Watchers participants had a weight gain of five pounds. Once again, when looking at the results of Levene's Test for Equality of Variances, significance was 0.084, which is greater than the alpha level of 0.05. Thus, there was no significance, meaning that equal variances are assumed. The analysis showed that long-term weight lost with Weight Watchers was not significantly different from weight lost with Atkins, $t(17) = 0.922$, $p > 0.05$. Results of the independent *t*-test for net weight loss can be found in Table 4.

Discussion

The expected result of this research study was that Weight Watchers would be the more successful diet because of its caloric restriction and lack of restrictions on food groups. Participants on Weight Watchers did lose more weight than those on Atkins, but not enough to be considered statistically significant for this study. Many possible reasons for this result will be discussed in detail in the following sections.

Table 4

Independent Samples Test for Net Weight Loss

	Levene's Test for Equality of Means		<i>t</i> -test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error Dif.
Equal variances assumed	3.361	0.084	0.922	17	0.369	20.483	22.204
Equal variances not assumed			1.666	17	0.114	20.483	12.292

Diet Adherence

Diet adherence statistics showed that participants had greater success with staying on Weight Watchers for longer periods of time. Atkins participants only averaged 60 days, while Weight Watchers participants averaged 247 days. The possible reasons for the difference in diet adherence includes greater satisfaction with a diet without restrictions on food groups. Low-carbohydrate diets are harder to stay committed to as previously discussed. High protein intake may increase satiety and suppress appetite for a period of time, but long-term restriction of carbohydrates leads to other problems. Some complaints that are given frequently for dieters that restrict carbohydrate intake are constipation and headaches (Astrup et al., 2004). These are explained by a reduced intake of fruit, vegetables, and whole-grain bread and cereals. Eventually there will be inadequacies in nutrition levels and a possibility of increased risk of cardiovascular disease and cancer. Halitosis, muscle cramps, diarrhea, general weakness, and rashes are often reported on low-carbohydrate diets as well (Astrup et al., 2004).

Lipid Catabolism

On a low-carbohydrate diet, the body relies more heavily on free fatty acids for energy due to low glycogen stores. The result of this is a higher level of ketone bodies (a by-product of fatty acid metabolism) in the bloodstream (Kenney, Wilmore & Costill, 2012). This causes a condition known as ketosis, which may pose a risk of cardiac arrhythmias (Astrup et al., 2004). Low-carbohydrate diets are associated with negative, unfavorable changes in total cholesterol and low-density lipoprotein levels, but positive changes in triglyceride and probably high-density lipoprotein values (Nordmann et al., 2006).

As previously stated, while following the Atkins diet, the human body turns to fat as its primary fuel source. This produces ketosis, which leads to increased levels of β -hydroxybutyrate acetoacetate and its by-products acetone and acetol. These products are possible precursors of the glycotoxin methylglyoxal. Methylglyoxal and its by-products are recognized as a significant cause of blood vessel and tissue damage. In a study done of Atkins participants, levels of methylglyoxal had a 167% increase. The increase in methylglyoxal implies that there is potential for tissue and vascular damage on the Atkins diet, and this should be considered when choosing a weight loss program (Beisswenger, Delucia, Lapoint, Sanford & Beisswenger, 2005). Because of the lack of long-term studies on the low-carbohydrate diet approach, physicians should continue to recommend a healthy lifestyle that includes exercise and a balanced diet and use caution in recommending Atkins (Bonow & Eckel, 2003). Complications that result from high levels of methylglyoxal can have a delayed appearance over a long period of time, so

low-carbohydrate diets could potentially lead to health problems in the future

(Beisswenger et al., 2005).

Short-term Compared to Net Weight Loss

When both independent *t*-Tests were performed, there was not a significant difference between the short-term or long-term weight loss results of Atkins compared to the Weight Watchers diet. Thus, no concrete conclusions can be made based on the data received. Although this study did not show significance, possibly due to a lack of participants, many current research studies have shown that although Atkins is effective in short-term weight loss, it is not sustainable for longer periods of time.

Energy Sources of the Body

The restriction of an entire food group in a diet, as Atkins restricts carbohydrates, affects the way the body produces energy. When the human body is at rest, it gains its essential energy almost equally from the breakdown of both carbohydrates and fats. While proteins serve important functions as enzymes for chemical reactions and form the building blocks for many structures, they are not a significant source of energy during metabolism. Carbohydrates are further broken down into glucose, which the body can use readily for energy. When the body does not have enough carbohydrate intake (resulting in smaller glucose stores), muscles can be deprived of their primary, preferred energy source. Carbohydrates are also the only energy source that is used by brain tissue. Therefore, there can be damaging cognitive effects due to severe carbohydrate restriction (Kenney et al., 2012).

Diet and Exercise

The body's ability to sustain its energy output during exercise is affected by the restriction in carbohydrate intake as well. Adenosine triphosphate (ATP) for energy during intense, short-duration muscular effort is generated by the metabolism of carbohydrates, with less reliance on fat sources. The rate of energy release from fat does not occur fast enough to meet the energy demands that come with high intensity muscular activity (Kenney et al., 2012). Thus, keeping up with regular physical activity while following the Atkins diet would be increasingly difficult. However, programs that include exercise along with dietary change produce greater weight loss than diet alone in both the short-term loss and long-term maintenance (Curioni & Laurencio, 2005). Low-fat and calorie-restricted diets, when paired with other changes in lifestyle such as an increased participation in physical activity, have a better result with long-term weight loss maintenance in addition to a delayed onset of diabetes (Nordmann et al., 2006). Combining moderate calorie restriction with increased exercise levels is the most sensible and healthy approach to reducing body fat stores (Kenney et al., 2012).

In a study of short-term and long-term weight loss success, participants had greater success when exercise accompanied their diet plan. One group only changed its diet, while the other group changed its diet and exercised regularly. Individuals in the diet and exercise group had an average weight loss of approximately 20% more than participants in the diet only group directly after completing their program. After one year, weight loss maintenance was still 20% higher in the group with diet and exercise as compared to diet only (Curioni & Laurencio, 2005).

When starting a weight loss program, participants should strive to lose body fat, not fat-free mass. Fat-free mass includes the muscles, skin, bones, ligaments, tendons, and internal organs. Especially relevant to dieting is the loss of muscle mass, which should be avoided. Combining diet and exercise is the preferred approach to achieving that goal. Increased activity along with calorie restriction prevents any possible significant loss in fat-free mass (Kenney et al., 2012). Certain behaviors have been identified as factors in maintaining weight loss. Those behaviors consistently reported include consuming a low-calorie, low-fat diet, and participating in high levels of physical activity (Wing & Phelan, 2005). Eating with a focus on better nutrition and self-monitoring of progress were some of the primary strategies used by participants who had successful weight-loss maintenance (Shick et al., 1998).

Short-term and Maintenance

To determine the effectiveness of a low-carbohydrate diet versus a low-fat or calorie-restricted diet, one study measured the weight loss of two groups after six months and again after twelve months. After six months, the participants who followed a low-carbohydrate diet had actually lost more weight than those that had been assigned to low-fat diets. However, after twelve months, there was no significant difference in weight loss between the participants in the low-carbohydrate or low-fat diets. Thus, low-carbohydrate diets seem to be at least as effective as low-fat diets for weight loss in the short-term. After approximately the first year, this advantage is lost (Nordmann et al., 2006). Recently, a review of low-carbohydrate diets reported that weight loss with low-carbohydrate diets is related to the duration of the diet and calorie restriction, but not to

the reduction in carbohydrate intake. When participants did not reduce their calorie intake, success rates for weight loss were not as high (Bonow & Eckel, 2003).

Comparing the effectiveness of low-carbohydrate versus calorie-restricted diets in the short term, the low-carbohydrate diet may result in greater weight loss in the first three to six months. However, studies that have considered long-term results show that the low-carbohydrate diet is not better for maintenance over long periods (Astrup et al., 2004). One explanation for the higher results in short-term weight loss for low-carbohydrate diets is ketosis. Excessive ketone bodies in the blood increase water loss. Much of this water loss occurs during the first week of the diet, which can account for large initial weight loss numbers in the low-carbohydrate diet group. On a calorie-restricted diet, water loss occurs at a slower rate (Kenney et al., 2012).

During a previous study on habits of people who were already successful at maintaining their weight loss for long periods of time, the percentage of those who followed low-carbohydrate diets was observed. Only 7.6% of all participants with successful maintenance rates reported eating fewer than 90 grams of carbohydrates in a day. These participants also had an unreasonably low total daily energy intake from food, suggesting that the maintenance success they had was due to calorie restriction as opposed to a low-carbohydrate diet. Compared to participants who had higher carbohydrate intake, those participants who consumed less than 24% of their daily intake from carbohydrates maintained their weight loss for less time and they were less physically active. Therefore, the high-carbohydrate, calorie-restricted eating pattern characterized most of the successful maintainers (Wing & Hill, 2001).

Study Limitations

The design of this study was cross-sectional, which comes with some limitations when analyzing the collected data. Since data collection only occurred one time without a control group, there could be multiple variables that produced the observed effects. This study looked only at short-term and long-term weight loss results without asking about physical activity levels or strictness of dietary adherence. Participants could have had varying levels of commitment to their diets, and increased exercise levels could have explained some of the weight loss observed. Most participants in this study were female, so gender could have played a role as well.

A longitudinal study of participants over a period of three to five years would produce increased accuracy in the data. Having the Atkins and Weight Watchers group follow their diet for six to 12 months and collecting the data of weight loss, and then measuring their maintenance success for the next few years would give better short-term and long-term data. The study would have been more ideal if there was a greater number and more equality in the number of participants in both Atkins and Weight Watchers participant groups. The original weight of the participants was not considered in this study, which could have caused data variance. In a long-term study, finding participants in a similar weight range would be preferred. Future research to add to this concentration area would be a long-term study on the effects of a low-carbohydrate diet, exceeding three to five years of adherence. Without a study of this duration, the diet cannot claim to have any beneficial long-term effects. The focus of the study would be to determine diet adherence levels and look at the side effects associated with ketosis with fat as a main

fuel source. Another beneficial study would be of long-term calorie restriction and its effect on humans and increasing of the lifespan.

Contributions

Although the data analyzed did not produce a significant difference, the data still agreed with current research on low-carbohydrate and calorie-restricted diets. When considering diets for weight loss, low-carbohydrate diets may be effective in the short-term, but calorie restriction showed itself to be more effective in the long-term. Also, there are fewer risks associated with calorie restriction, as long as it is moderate, around 500 less calories per day (Astrup et al., 2004). Most people attempt to lose weight on their own without a formal diet program, whether to save money, or out of convenience, so it is reasonable for diet programs to condition their participants to form habits that will help them once they cease to follow the program. The best recommendation for people who want to lose weight and keep it off is a permanent switch to a low-fat, calorie-restricted diet combined with regular physical activity.

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Appendix A

Survey Questions for Participants

1. What is your age?
 - 25 to 34
 - 35 to 44
 - 45 to 54
 - 55 to 64
 - 65 to 74
 - 75 or older

2. What is your gender?
 - Female
 - Male

3. What is your race? Mark one or more.
 - White
 - Black or African American
 - Asian
 - Native Hawaiian or Other Pacific Islander
 - American Indian or Alaska Native
 - Other

4. Which of these two diets did you follow? (If you have followed both diets, I would love for you to take this survey again and answer the questions for the other option!)
 - Weight Watchers
 - Atkins

5. How much time did you spend on the diet? (Answer in days)

6. How much weight did you lose on the diet? (Answer in pounds)

7. How much weight was regained after 6 months off of the diet? (Answer in pounds)