

ABSTRACT

Self-Perceived Nutrition Knowledge vs. Actual Nutrition Knowledge and Willingness to Participate in Fad Diets

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With the rising obesity epidemic in America, there has also been a dramatic increase in the marketing of “fad diets” for weight loss. However, many of these diets are based on false claims and pseudoscience and can in reality be harmful to one’s long-term physical and mental health. Students were asked to rank their confidence in their level of nutrition knowledge from 1-5, and then complete a basic 20-question nutrition test. Of those most confident in nutrition (ranked themselves at 5), 53.8% had participated in fad diets, and the average score on the quiz was 14.3/20. The results show that more confidence in nutrition knowledge correlates with more willingness to participate in fad diets. However, we found that those more confident in that knowledge did not perform well on the basic nutrition test, with their average score being 71.5%.

Self-Perceived Nutrition Knowledge vs. Actual Nutrition
Knowledge and Willingness to Participate in Fad Diets
by

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A Thesis

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DEDICATION

To my husband, Ty, who encouraged and supported me throughout my years in higher education; who sacrificed his own time, desires, and resources to make this degree possible. Thank you for always believing in me and helping me to see everything that I was capable of. To my parents, Jeff and Kathy, who raised me to be hard working, committed, level-headed, and to chase my dreams; who made sacrifices my entire life so that I could achieve great things. Thank you for loving and supporting me, everything I am today I owe to you.

CHAPTER ONE

Introduction

Background

Obesity is a growing problem worldwide, with overweight and obesity rates tripling since 1975. More people around the world are now dying from consequences of obesity and overfeeding than from underfeeding and malnourishment, a phenomenon that historically has never been seen (*Obesity and overweight*, n.d.). In America, over 33% of adults are said to be obese or extremely obese (Peskin, 2003). This increase in those experiencing obesity and being overweight has likely been the cause of the increase in popularity of fad diets. The term “fad” can be defined as, “a practice or interest followed for a time with exaggerated zeal; craze” (*Definition of FAD*, n.d.). The definition of “fad diet” is “any number of weight-reduction diets that either eliminate one or more of the essential food groups, or recommend consumption of one type of food in excess at the expense of other food; fad diets rarely follow modern principles for losing weight” (*fad diet*, n.d.). Rapid weight loss, quantities and limitations, specific food combinations, rigid menus, and no exercise required are often qualities of fad diets that are backed by flawed research and unhealthy practices (*Staying Away from Fad Diets*, n.d.). In the new age of social media, people are constantly bombarded with information and misinformation from both expert and non-expert sources, and this large volume of information and misinformation presents certain challenges. First, that opposing views cause “public confusion, frustration, indifference, information overload, or resistance to evidence-based health recommendations”. Second, research shows that the public is likely to believe and

act upon the information they are exposed to first, even if that information is corrected or refuted in the future (Tan et al., 2015).

Current recommendations for a healthy diet are that 45%-65% of calories should come from carbohydrates, 20%-35% of calories should come from fats, and 10%-35% of calories should come from protein (Blake, n.d.). The United States Department of Agriculture created the MyPlate diagram in 2011 to serve as a visual guide for meals to reflect these nutrient recommendations in a way that is easy to understand and apply for consumers. The diagram was designed to help consumers translate recommended nutrient distribution into food. MyPlate recommends consumption on 5 food groups (grains, protein, fruits, vegetables, and dairy) in specific portion sizes to help ensure that all macro- and micro-nutrient requirements are met (*Choose MyPlate*, n.d.).

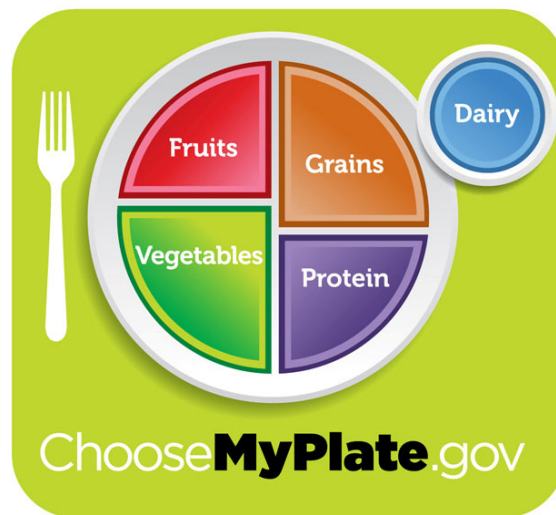


Figure 1: MyPlate Diagram

Ironically, many fad diets focus on elimination of a variety of food groups, claiming that certain nutrients are not needed or that they are even harmful to the body. For example, the “keto diet” focuses on eliminating carbohydrates and recommends

consumption of high amounts of fat and protein in an attempt to place the body in a state of ketosis. Ketosis is when the body utilizes ketones and stored fat for energy (“The Ketogenic Diet - A Keto Guide for Beginners,” 2013). While this is true of ketosis, it is also established physiology that ketosis uses both fat and lean mass (muscle) stores for fuel, and that the body’s most desired source of energy is carbohydrate. It is also known that prolonged ketosis will cause a buildup of ketones in the blood, which can become toxic and put a major strain on the kidneys. “People will do anything to get the weight off,” however, a keto diet will do more harm than good for the majority of people who follow it, especially if they have any underlying kidney or liver issues (*Keto Diet Dangers You Should Know About*, 2014). Fad diets are popular among those of all weight classes and age groups. A study on adolescent girls showed that those wanting to lose at least 10% of their current body weight rated fad diets very desirable in helping them lose the weight, even when they were aware that other, more healthful diets were available (Storz & Greene, 1983).

A study that surveyed young adults participating in the gluten free diet observed that adherence to this type of diet correlated with other positive health behaviors. Results showed that even though the gluten free diet is not superior to a normal, balanced, gluten containing diet, participants tended to have better dietary intake overall due to their general interest in food and nutrition. However, those who followed the gluten free diet were more likely to participate in unhealthy weight control behaviors and were overly concerned with their weight (Mary J. Christoph, PhD, MPH et al., n.d.). The high food restriction mindset in those that follow the gluten free diet and other fad diets could be a risk factor for developing an eating disorder due to the tight control of food and the over-

concern with body image as related to body weight. This obsession with healthy eating is known as “Orthorexia Nervosa”, described as “a pathological fixation with healthy food that has aptly been described as “a disease disguised as a virtue” (Koven & Abry, 2015).

Studies have shown that teaching children basic nutrition skills in grade school is effective in helping students understand the link between food and health. However, many teachers report time constraints to teach nutrition in depth, and limited access to resources to be a well-informed educator on the subject. In a study done on the level of nutrition education taught in urban schools, less than one-third of teachers reported having any formal or informal training in nutrition science (Perez-Escamilla et al., 2002). However, another study showed that tested nutrition knowledge does not correlate with better eating habits and nutrition practices, which might suggest a need for higher levels of nutrition education. The study suggests a need for a more dimensional basis for nutrition education in grade school to improve cognition, not merely nutrition knowledge (Dwyer et al., 1970).

Health Literacy is defined as “the capacity to obtain, communicate, process, and understand health information and services in order to make appropriate health decisions” (*v-healthcare-workforce.pdf*, n.d.). Low health literacy has been shown to correlate with poor nutrition and health practices. A study conducted with employees at a Midwest university showed that health literacy is much lower than expected among the well-educated people working at the university (mean years of formal education was 16.6 years). Results showed that at least 17% of participants were unable to interpret a basic nutrition label. The findings suggest that addressing health issues and investing in health education would be beneficial even among highly educated populations (*Health Literacy*

Deficits Found Among Educated, Insured University Employees - Joyce I. Karl, Jodi C. McDaniel, 2018, n.d.).

Nutrition education is valuable for the general public, but especially for those in the health and medical field. Grammatikopoulou conducted a study on physicians' nutrition knowledge. They analyzed competency in clinical nutrition compared to their confidence in clinical nutrition. Sixty-nine percent reported prescribing diets on a regular basis, yet 78.2% were unable to identify malnutrition. When tested, 65.2% of the physicians were considered "inadequate" in their knowledge in clinical nutrition. However, 30.4% of the 115 physicians surveyed claimed to have an expert level of clinical nutrition knowledge, yet failed the clinical nutrition assessment. Eighty-six percent agreed that more clinical nutrition training would be beneficial to their career (Grammatikopoulou et al., 2019).

The Dunning-Kruger Effect can explain the results in the physician study with a simple graph. It is a graph that compares confidence in a topic to actual knowledge. The graph yields an inverted bell curve indicating that little knowledge leads to much confidence. As one gains knowledge in a topic, confidence decreases because they realize how much more there is to know. It is not until near expert level of knowledge is achieved that confidence begins to increase again (Murphy, n.d.).

Dunning-Kruger Effect

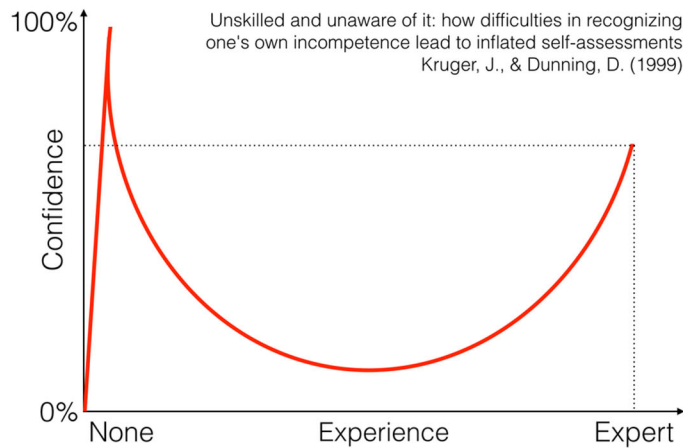


Figure 2: The Dunning-Kruger Model

An interesting anecdotal phenomenon about fad diets, is that those who follow them are often extremely confident in the diet and in their own knowledge to support the diet. However, these fad diets are counterintuitive to basic nutrition facts. With the number of popular diet trends growing, along with those that follow them, the popularity of these diets challenges the expertise of nutrition professionals and true nutrition facts. There is a lack of research regarding level of nutrition knowledge and willingness to follow fad diets to improve overall health or to simply lose excess weight.

This study will test whether inadequate nutrition knowledge correlates with high confidence in nutrition knowledge and participation in fad diets. It is hypothesized, according to the Dunning Kruger Effect, that college students who rank high for confidence in nutrition knowledge yet score low on a basic nutrition assessment will have that highest participation in fad diets that are not supported by nutrition science.

Rational

Does high self-perceived nutrition knowledge and low actual knowledge correlate with more participation in fad diets? The purpose of this study is to find a correlation between high confidence in self-perceived nutrition knowledge with lack of actual nutrition knowledge and participation in fad diets. If a correlation is found, then a case can be made for the need to better educate the general public about health and nutrition, leading to a healthier nation that better understands food and nutrition.

Objectives

Our primary objective was to determine if less nutrition knowledge correlated with more confidence in nutrition knowledge. Our secondary objective was to determine if less nutrition knowledge correlated with more participation in fad diets.

CHAPTER TWO

Materials and Methods

Selection and Recruitment

The study population was full-time, undergraduate students at a private university, 18-25 years of age. The population included both male and female students. Exclusion criteria were students majoring in nutrition sciences. The study used a convenience sample of students. Professors at the university who taught a variety of majors were contacted, at which point the professor can choose to participate. The professors gave the students time to complete the questionnaire in class without the help of technology or peers. Part 1 was a survey about nutrition background and habits. Part 2 was a basic nutrition test. Students answered questions independent of any help from peers or technology. Students were free to withdraw their participation at any time during the study.

Design and Methods

This was a cross-sectional study. All students in the volunteered classes were encouraged to participate. For students who do not fall within the inclusion criteria, the survey results were not used for the final analysis. Sample size goal was 150 valid questionnaires total, however we were able to collect 330. Sample size was based on a similar study done on physicians in Greece (Grammatikopoulou et al., 2019). The questionnaire was designed specifically for this research study- Part 1 was a survey to gather age, confidence in nutrition knowledge, level of nutrition education, participation

in fad diets, personal food practices, and goals of dietary choices. Part 2 was a basic nutrition test to evaluate true nutrition knowledge. Reference for Part 1- A similar design was used in the study on physicians in Greece (Grammatikopoulou et al., 2019). Reference for Part 2- All questions can either be found directly or indirectly in this basic nutrition textbook: Blake JS. Nutrition: From Science to You, 4th Edition (Blake, n.d.). Students were given a packet containing Part 1 followed by Part 2 of the questionnaire. Students completed the questionnaire in the order they came, in view of the observing professor, without the help of peers or technology.

Statistics

A cross-sectional survey of a convenience sample of participants was used. Target sample size was 150 eligible participants, with 330 participants completing the questionnaires or surveys. Variables of fad diet participation were first categorized based on rank of self-perceived nutrition knowledge and then by score on the nutrition quiz. Averages were then calculated to determine correctness of students' self-perceived nutrition knowledge and rates of participation in fad diets. A Spearman Correlation was conducted with the two main variables being "rank" (self-perceived nutrition knowledge) and "score" (actual knowledge as estimated by score on a basic nutrition quiz). A one-tailed test was used to predict that individuals who are more confident in their nutrition knowledge would score lower on the basic nutrition quiz. Significance level was set at 0.05.

CHAPTER THREE

Results

Participants

Surveys were distributed and 330 collected (Survey and Quiz included in Appendix). Surveys reached about 2.33% of the undergraduate population of 14,188. Survey demographics also correlated with the University's male/female ratio of about 40/60%. (*How Does Baylor University Rank Among America's Best Colleges?*, n.d.). Demographics of research participants can be found in Table 1.

Table 1. Demographics

Age Mean (\pm SD)	Gender n (%)	Rank n (%)	Score Mean (\pm SD)
20 (\pm 1.3)	F- 225 (68%) M- 105 (32%)	5- 27 (8%) 4- 95 (29%) 3- 158 (48%) 2- 45 (14%) 1- 5 (2%)	14 (\pm 2.3)

Students were asked to rank their perceived level of nutrition knowledge from 1-5 (5 being well above average knowledge, 1 being no knowledge), list any diet that they had participated in, and then take a 20-question nutrition quiz to test that knowledge. All questions in this quiz can either be found directly or indirectly in this basic nutrition textbook used to teach an introduction to nutrition class at Baylor University: Blake JS. *Nutrition: From Science to You*, 4th Edition (Blake, n.d.).

Scores for the quiz were then classified as 1-5 to test accuracy of self-perceived knowledge and for comparison purposes. Classifications were made to best match percentiles of peoples' self-perceived nutrition knowledge ranking. Due the nature of discrete data, percentiles do not match perfectly. Data represented in Table 2.

Table 2. Percentiles of students' self rank vs. their score's rank.

Self-perceived rank	Percent of students	Score classification	Number of questions correct	Percent of students
5	8.18%	5- sufficient	18-20	6.36%
4	28.79%	4- some knowledge	16-17	19.7%
3	48.18%	3- poor knowledge	13-15	51.82%
2	13.33%	2- very poor knowledge	11-12	15.15%
1	1.51%	1- not knowledgeable	0-10	6.97%

Anticipating True Nutrition Knowledge

By using the scoring method mentioned above, we are able to assess correctness of students' self-perceived nutrition knowledge compared to the score they earned on the nutrition quiz. This data compares how students ranked themselves in their self-perceived nutrition knowledge with the classification of the score they received on the nutrition quiz. Data represented in Table 3.

Table 3. Correctness of student’s self-perceived nutrition knowledge

Score Classification	5	4	3	2	1
% Students whose self perceived nutrition knowledge matched with their score on the nutrition quiz.	3.7%	24.2%	55.3%	20.5%	20%

Comparison of self-perceived nutrition knowledge (rank) to actual nutrition knowledge (score on nutrition quiz) is presented in Table 4 and classified into groups of inadequate (score classifications 1-3) and adequate (score classifications 4-5). Of the 330 participants, 122 (37%) ranked themselves as having adequate nutrition knowledge, yet only 43 of those participants actually scored adequately on the nutrition quiz. Of this group with high confidence and low performance, 68.4% had participated in fad diets. A similar method of scoring was used to assess medical practitioners self-perceived and actual level of nutrition knowledge (Grammatikopoulou et al., 2019).

Table 4: Differences in nutrition knowledge of young adults of higher education, perceived vs. actual

Perceived Knowledge (rank)	Actual Knowledge (scored 0-15) Inadequate	Actual Knowledge (scored 16-20) Adequate	Total
Inadequate (ranked 1-3)	165 (50%)	43 (13%)	208 (63%)
Adequate (ranked 4-5)	79 (24%)	43 (13%)	122 (37%)
Total	244 (74%)	86 (26%)	330 (100%)

* Results listed as n (%)

Participation in Fad Diets

The main objective of this study was to see whether a rating of high confidence in nutrition knowledge (score of 5) correlated with poor actual nutrition knowledge and high participation in fad diets. The results as they related to this objective are shown in Table 5.

Table 5. Frequency of diet participation and average scores

Rank	Percent of people who participated in fad diets	# of Diets/ Person	Score out of 20
5	53.8%	1.46	14.3
4	55.6%	1.01	14.5
3	37.1%	0.62	14.0
1 and 2	38.8%	0.49	13.22

*Due to a small sample size of ranks 1 and 2, the groups are combined for comparison purposes.

The survey results support the idea that more confidence correlates with a higher participation in fad diets. However, a higher confidence in self-perceived nutrition knowledge also correlated with slightly higher scores on the nutrition quiz (a jump from 13 to 14.3 out of the 20 questions). This average score was only improved by 7.5%, and this range of scores all fall into the same “3- poor knowledge” category on our scale. It is also interesting to note that the group who scored the highest of 14.5/20 was actually the group that ranked their self-perceived nutrition knowledge as a 4 instead of a 5.

The group that had both high confidence (rank) and low competency (score) had the highest rates of diet participation of 68.4%. Whereas the group that had low confidence (rank) and high competency (score) had the lowest rates of diet participation of only 27.9%. Results are described in Table 6.

Table 6: Frequency of diet participation in groups of nutrition knowledge of young adults of higher education, perceived vs. actual

Perceived (rank)	Actual (scored 0-15) Inadequate	Actual (scored 16-20) Adequate
Inadequate (ranked 1-3)	39.4% of n=165	27.9% of n=43
Adequate (ranked 4-5)	68.4% of n=79	58.1% of n=43

* Results listed as percentage of diet participation in the defined group as explained by Table 4.

Correlations of Ranks and Scores

The correlation coefficient of the Spearman Correlation test was 0.1442524 with a p-value of 0.004342, with the significant value of 0.05. Data represented in Figure 3.

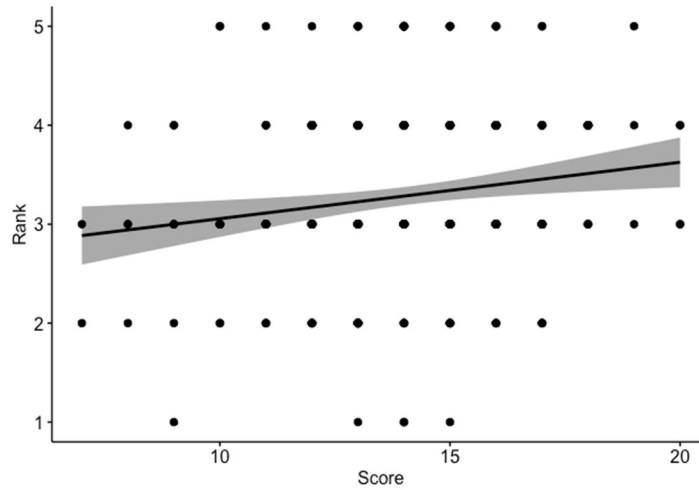


Figure 3. Spearman Correlation

Limitations

Limitations of this study include convenience sampling that may not represent the true demographics of our population of those aged 18-25 years in America perfectly.

Other limitations include inability to access nutrition education prior to higher education,

as only students pursuing a degree in nutrition sciences were excluded. The fact that the nutrition assessment was multiple-choice means a student guessing on a question could have resulted in a correct answer, thus incorrectly estimating the student's actual level of nutrition knowledge.

CHAPTER FOUR

Discussion

Anticipating True Nutrition Knowledge

Our results suggest that undergraduate students do not correctly understand their true level of nutrition knowledge. The vast majority of participants incorrectly rated their level of nutrition knowledge as compared to the score they received on the nutrition quiz at the end of the survey. Thirty-eight percent of students over-estimated their actual nutrition knowledge based on the score they received on the nutrition quiz. Twenty-four percent of students thought themselves to have high levels of nutrition knowledge, yet scored poorly on the basic nutrition quiz. Of the group with high confidence and low performance as described in Table 3, 68.4% had participated in fad diets. This concentration of dieters is a large increase compared to the “self-perceived adequate” category (those ranking their nutrition knowledge as a 4 or 5) as a whole, whose percentage of diet participation was about 54% as described in Table 5. These results are similar to that of the study of physicians in Greece (Grammatikopoulou et al., 2019). This sense of false confidence may foster the spread of misinformation as well as the pseudo-science of fad dieting (Tan et al., 2015).

Participation in Fad Diets

The survey results indicate that while there was a positive trend in self-perceived rankings, participation in fad diets, and actual score on the nutrition quiz, all of the average scores were considered “poor” by academic standards (ranging from 65% to

72.5% correct). This is especially alarming given the fact that the questions asked on the nutrition quiz were extremely elementary and taken out of a textbook used to teach a nutrition introduction class (Blake JS. Nutrition: From Science to You, 4th Edition).

Results in Table 6 affirm the hypothesis that college students who rank high for confidence in nutrition knowledge, yet score low on a basic nutrition assessment will have the highest participation in fad diets that are rooted in pseudoscience. These results also align with the theory of the Dunning-Kruger Effect (Murphy, n.d.). Those who are confident and incompetent in basic nutrition science are nearly 2.5 times more likely to participate in fad diets and spread harmful misinformation about nutrition than those who are not confident yet are competent in nutrition science.

Correlations of Ranks and Scores

It can be concluded that there is a positive correlation between rank (nutrition confidence) and score (nutrition knowledge). It is important to note however, that though the test is statistically significant, the results are very weak according to the very low correlation coefficient. The results are also not practically significant as those ranking themselves as a 5 scored on average only 1.3 points higher on the nutrition quiz than did those ranking themselves as a 1. Even with the 1.3 point increase, the average score for the group ranking themselves as a 5 was 14.3/20, putting their actual knowledge in the “3- poor knowledge” category. Results are shown in Table 5 and Figure 3.

CHAPTER FIVE

Conclusions

The results of this study indicate that confidence in self-perceived nutrition knowledge does not predict actual knowledge. Results also show that the majority of fad dieters are both confident and incompetent in nutrition knowledge. These are the people who may spread false information regarding food, nutrition, health, and body. Fad dieting is harmful to both physical and mental health as it makes false claims to improve health and wellness, and encourages the idea of body manipulation and poor body image (Koven & Abry, 2015).

Many educated and influential people partake in harmful fad dieting and the spreading of misinformation that can be harmful to one's health. They are extremely confident in their self-perceived nutrition knowledge, yet they lack the true facts of nutrition and human physiology. By participating in and encouraging fad diets, these people are perpetuating the cycle of harmful eating habits that lead to deteriorating physical and mental health. To combat this issue, nutrition education from a registered dietitian before young people leave academia and become role models and leaders in the community is crucial to correcting these harmful actions before they take place.

APPENDIX

APPENDIX

Nutrition Survey and Quiz

Nutrition Survey

Classification: FR SO JR SR // Other
Full-time student? Yes No
Age: _____
Gender: Male Female
Major of Study:

How would you rank your current level of nutrition knowledge compared to other college students?

1- none 2- some 3- average 4- above average 5- well above average

What diets have you participated in, currently or previously, if any? (circle all that apply)

None/ Whole 30/ Gluten Free Diet/ Atkins Diet/ Keto Diet/ Juice Cleanse/ Paleo Diet/ Fasting
Other:

What food product characteristics drive you to make specific food purchases? (circle all that apply)

None/ Organic/ Non-GMO/ Local/ Grass-fed/ Free range/ Gluten Free/ All Natural
Other:

What is your goal when making food and diet choices? (circle all that apply)

Weight management/ healthy lifestyle/ prevent chronic disease/ to treat a medical diagnosis
Other:

Quiz

1. What is the human body's preferred and primary source of energy?
 - A. Carbohydrates
 - B. Protein/ Ketones
 - C. Vitamin B12
 - D. Fat
2. What is a "calorie"? (In the context of nutrition)
 - A. Fat
 - B. Energy
 - C. Heat
 - D. Weight
3. Fat helps the body absorb more nutrients.
 - A. True
 - B. False
4. Which of the following is not a food group according to MyPlate?
 - A. Oils
 - B. Dairy
 - C. Grains
 - D. Proteins
5. Which is NOT a macronutrient?
 - A. Water
 - B. Protein
 - C. Carbohydrates
 - D. Calcium
6. What should be the goal rate for weight loss?
 - A. 1-2 pounds per week
 - B. 3-4 pounds per week
 - C. 5-10 pounds per week
 - D. 10+ pounds per week if possible
7. Fortification and the processing of food is a poor practice, it would be better if all foods were "natural".
 - A. True
 - B. False
8. Food insecurity and malnutrition is a major problem in the United States.
 - A. True
 - B. False
9. A healthy diet means having a routine of eating about the same thing everyday.
 - A. True
 - B. False

10. Which food contains the highest amount of fiber?
- A. Steak
 - B. Apples
 - C. Canned peaches
 - D. Yogurt
11. Which food is a complete protein?
- A. Peanut Butter
 - B. Beans
 - C. Chicken Breast
 - D. Spinach
12. Dietary supplements are necessary to meet your nutrient needs
- A. True
 - B. False
13. Oreos and cookies can be apart of a balanced diet.
- A. True
 - B. False
14. Which is NOT a micronutrient?
- A. Zinc
 - B. Copper
 - C. Gold
 - D. Folic Acid
15. It is impossible to consume to toxic levels of vitamins.
- A. True
 - B. False
16. Sugar substitutes, like Aspartame in diet sodas, should be avoided because it causes cancer in humans.
- A. True
 - B. False
17. Nutrition labels base values off of an average _____ calorie diet.
- A. 1,000
 - B. 1,500
 - C. 2,000
 - D. 2,200
18. Good nutrition at a young age can help prevent which of the following conditions?
- A. Cancer
 - B. Stroke
 - C. Heart Disease
 - D. All of the above

19. At what stage in life does diet play a role in lifelong health?

- A. Infancy
- B. Teenager
- C. After puberty
- D. All of the above

20. Excess protein intake will be stored as muscle

- A. True
- B. False

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