Peer review

Cho, Bryan. 2024. "A Sentiment Analysis to Investigate the Sentiment of Users on Fad Diet Content on Tik Tok." *Journal of High School Science* 8 (4): 103–21.

1.I will need to see the number of views for each video (for the 10 videos) from each hashtag. There are 42 million adolescents of which assuming 22 million watch tik-tok everyday, the total sample size from the views for the 10 videos must be large enough to derive statistically meaningful results. Please present this information in a table similar to Table 1 in the manuscript and derive the statistical power of the study using these numbers in the table. Present the statistical power in the manuscript along with justification. For 250 comments and a population of 22 million, your study is statistically underpowered (your minimum sample size needs to be 385). Your margin of error (Type I error with a 250 sample size can only be a minimum of approx. 6.2% (not 5%)), and your confidence level would be 90%.
See: http://www.raosoft.com/samplesize.html, you will need to put this down as a limitation of the statistical analysis in your manuscript.

2.How do you have 250 comments, if you chose 10 comments from each of the 50 videos? Should you not have 500 comments?Should the total number not add up to 100 for each diet in Figure 2 ?

3.Present the full comment (column 1) in Figures 3, 4, 5, 6 and 7 in the manuscript.

4.For the ANOVA, are you comparing polarity values across the 5 diets ? If so, your conclusion should be that since the average between means for the different polarities across the 5 diets is significantly different than then average among means for the different polarites, there is a statistical

difference between sentiments for different fad diets. This implies that the users perceive one fad diet to be significantly better (or worse) than another.

5.You have unnecessarily repeated information in the text that is already in the figures. Please remove redundancy in the text.

6.The figures need to be re-formatted into text so that they can be inserted into Tables in a word document. We will need you to convert Figures 3 through 7 into Tables that can be manipulated in a word document.

7.You have not submitted a word document properly formated per the Journal's guidelines, please do so when submitting the revised manuscript.

8.The references need to be sequentially numbered in the text. Change the woks cited to a numbered References section. Please ensure that the reference format meets the Journal's guidelines. Please have live links for each reference. Do NOT use the word software's automated numbering facility to number references, instead number them manually.

9.How many comments were embedded as a 'comment thread'? How many comments were the "first comment"; i.e. the start of a comment thread? Is it not true that a comment that responds to a comment generally follows the same polarity as the comment at thread start? Please discuss and explain this in the manuscript and its implications on your results. A Table that indicates the polarity of Thread start versus the polarity found would be helpful.

A Sentiment Analysis to Investigate the Sentiment of Users on Fad Diet Content on Tik Tok

(Addresses number 7. Research paper is now written on word document with correct journal guidelines)

By Bryan Cho

Abstract

The rate of obesity has risen drastically throughout the past few decades. In order to decrease the rate, people have utilized social media in order to spread nutritional information. These include information on fad diets, which are typically described as quick and easy methods to lose weight. Fad diets have been prevalent throughout all social media platforms, however, TikTok has little research on the impact of fad diet content. In order to gain further insight on the influence fad diet content can have on its young users, the objective of this study is to utilize a sentiment analysis to analyze 250 TikTok comments from five different popular fad diet hashtags. 10 comments were selected from each video with 5 Tik Tok videos, being selected for each hashtag. These hashtags that are utilized will be from the greatest number of views and an inclusion criterion has been created in order to reduce the number of skewed data. Research from this investigation found that the polarity of users was mostly positive with 50.8% of comments having overwhelmingly positive and positive reactions, 33.6% of comments having overwhelmingly negative and negative reactions, and 15.6% of comments having neutral

reactions. With the view of most users on Tik Tok being positive, the negative impacts of fad diets are able to influence more users, jeopardizing the health of the young audience on TikTok.

Key Tags

Sentiment analysis, Tik Tok, Fad diets

Introduction

1.1 Prevalence of Obesity

Obesity is a disorder where an individual has "weight that is higher than what is considered healthy for a given height (CDC, 2023). Throughout recent years, the US obesity prevalence rate has increased: from 1999 through 2020, the US obesity prevalence increased from 30.5% to 41.9%. Additionally, during the same time period, the prevalence of severe obesity increased from 4.7% to 9.2% (CDC, 2023). Conditions of obesity include heart disease, stroke, type 2 diabetes, and certain types of cancer, which are the leading causes of preventable, premature death (CDC, 2023). In the increasing rate of obesity throughout the United States, there has been a growing amount of interest in dieting to prevent obesity (Tahreem et. al, 2022). From 2004 to 2018, a study has reported that the internet searches related to weight loss have immensely increased (Teng et. al, 2020). These people believe that adopting these diets into their lifestyle is their way to solve their long term problems of weight and body image. However, these diets that are prevalent on social media that have been tailored towards promoting a healthy lifestyle and preventing obesity push unachievable body images and

intense eating habits by exploiting people (Mordzejewska et. al, 2022). These diets are classified as fad diets.

1.2 Fad Diets

A fad diet is a weight loss plan that utilizes specific nutritional content in order to lose weight fast (Tahreem et. al, 2022). These diets are backed up by little scientific research, providing people with less calories and nutrients, which ends up hurting people more than helping them (Tahreem et. al, 2022). However, although to a certain extent, some fad diets are able to be healthy, the potential long term consequences of fad diets are still not clear (Tahreem et. al, 2022). In social media, fad diets have been popularized, influencing individuals to partake in fad diets to improve their body image or to prevent obesity. This has caused countless users to have immense exposure to numerous influencers and weight/food related content that has caused individuals to be "at risk of having internalized body image and disordered eating behaviors" (Minadeo et. al, 2022). Interacting with this type of content has also caused individuals to develop a glorification of weight loss causing them to resort to "maladaptive measures [such as] very restrictive diets, use of laxatives, [and] vomiting" (Mordzejewska et al., 2022). This proposes a massive problem through the usage of social media as most users are adolescents or children. These younger audiences are more susceptible towards developing eating patterns due to peer pressure and trying to fit in with society's image of a perfect body

(Hsu, 2023). They want to obtain the ideal body image that is glorified on social media and when they ultimately can't, it leads to feelings of inferiority, depression, and low self esteem (Mills et. al, 2022). Additionally, these methods of losing weight fast have been correlated towards many health risk factors such as heart disease, cancer, diabetes, increased LDL cholesterol as well as reduced muscle and energy (Khawandanah, 2016; Kurnialandi, 2023). All of these factors contribute to the high number of deaths correlated with eating disorders, being highlighted as the second leading cause of death by the Eating Disorders Coalition (EDC, 2019). With numerous studies showing the negative implications of social media usage like Instagram and Snapchat, one social media app,

Tik Tok, has little research about the connection of fad diets and its users.

1.3 Tik Tok

There are currently around 150 million users on Tik Tok (TikTok, 2023). In a survey conducted by Pew Research, around 63% of teenagers ages 13 to 17 in the United States have reported using Tik Tok. 78% of those same teenagers in the same demographic have also reported utilizing Tik Tok several times a day or almost constantly (Pew Research Center, 2023). With Tik Tok being a massive part of a majority of teenagers' lives in the United States, these teenagers constantly interact with the variety of content available on Tik Tok. This variety includes the popular rise of nutritional and health content specifically regarding fad diets. These videos have received

numerous views, accumulating around billions of views with most pushing unhealthy eating habits onto their audience. Examples include #keto - 13.1B, #detoxdiet - 19.7M, and #mediterraneandiet - 243.3M. Thus, it is important for these young Tik Tok users to understand the implications of these fad diets that Tik Tok creators try to push on its users.

1.4 Goal of Research

With numerous studies showing a negative correlation between the usage of fad diets and users' health in social media apps, there has been little studies on how exactly users perceive these types of content in Tik Tok. In an attempt to figure out the perception of Tik Tok users on fad diet content, this study utilizes a sentiment analysis in order to understand the reactions of users through analyzing comments. It is important to understand how these users react towards fad diets in order to gain a better understanding of the impact fad diets can have on its users. Depending on the polarity of the sentiment of users, the propensity to share content will increase or interactions of fad diet content will increase (Oh, 2022). Additionally, the general view of fad diets can be identified in order to see if there is constant positive reinforcement of these dietary patterns, which can lead to more users adopting these harmful fad diets (Zheng et. al, 2013). Ultimately, this research aims to gather 250 comments from 5 popular fad diets hashtags on Tik Tok and determine the reactions of these comments through a sentimental analysis.

Methods

In social media apps, hashtags are used to classify videos by certain categories. In Tik Tok specifically, content creators incorporate hashtags in the videos they create in order to categorize their content through a word or phrase. In this study, in order to gather the comments of users specifically towards fad diet content, hashtags were collected based off of popular fad diets that are present on Tik Tok. These popular fad diets were based on Aaiza Tahreem's study, a researcher in the National Institute of Food Science and Technology. These fad diets which were all promoted to be a quick way to lose weight include the Atkins, Ketogenic, Mediterranean, Vegetarian, and Detox Diet, In total, a total of five hashtags were collected. These hashtags were then based off of the most popular hashtags on the search bar in Tik Tok. Each fad diet was written into Tik Tok's search bar and the hashtag with the most total views were collected for video collection. Only one exception was made, which was the Atkins Diet hashtag as the videos listed on the hashtag were in different languages. The second most hashtag was utilized instead as English was primarily the main language to be utilized in these videos to understand the context of the video, comments, and to be able to check the analysis.

Table 1

List of Fad Diet Hashtags

Fad Diets	Hashtags	View Count
Atkins Diet	#atkinsdiet	10M
Ketogenic Diet	#keto	13.1B
Mediterranean Diet	#mediterraneandiet	243.3M
Vegetarian Diet	#vegetariandiet	7.2M
Detox Diet	#detoxdiet	19.7M

After gathering the hashtags, a random selection method was then utilized in order to see which ten videos would be chosen from each hashtag. Depending on the number selected, the videos from the hashtag list would be counted until the number that was selected was counted up. The random selection was utilized on Google and had a range from 1 through 100. A total of 5 videos were collected from each hashtag, totaling up to a total of 25 videos from all five hashtags. However, a problem that existed with the hashtag feature was that often videos that were tagged with a hashtag did not discuss the topic of the hashtag.

Users would either include a lot of hashtags in their videos where they would not discuss the entirety of the hashtags or include a few to reach out towards specific audiences or incorporate the wrong hashtags. In order to fix this problem, when a video is being chosen, it needs to fit into the codes developed by Marisa Minadeo, researcher in the Department of Food Sciences and Nutrition. In her research, Minadeo developed codes for food, nutrition, and weight-related posts that were popular on TikTok. These types of contents are all core aspects of fad diet content. When collecting the videos, a code from Minadeo's research

had to match up to the videos chosen. For example, if there was a video about the Keto diet, where the content creator discusses a recipe from the Keto diet, this would match up with the "Food" code. This would mean that the video would be suitable for gathering comments to analyze. Additionally, another requirement for video selection was that the video needed to have over 10 comments.

Table 2

List of Codes from Marisa Minadeo

Codes	Definitions
Nutritional Advice	Creator provides nutrition guidance or beliefs
Food	Food is present in video
Body Image	Body image is discussed or portrayed in the video
Health	Video contains the hashtag health or the creator discusses a health behavior
Diet	Portrays or references a diet such as keto, paleo, intermittent fasting, weight watchers, Atkins, etc.
Eating disorder promotion	Video glorifies an eating disorder or gives strategies for perpetuating the eating disorder
Eating disorder recovery	Video shows recovery steps or encourages recovery from an eating disorder
Health halo	A food is glorified for its health qualities such as salad or granola
Calories	Creator mentions calories
Weight loss	Creator mentions weight loss
Physical activity	Video portrays or mentions physical activity including dance

Weight Bias/Fat Stigma	Video explicitly combats weight bias/fat stigma by explaining the negative impacts of weight bias, or how to stop bias towards fat people and weight gain from occurring Video perpetuates weight bias/fat stigma by displaying dislike or assigning negative attributes towards fat people or gaining weight.
Culinary Instruction	Video reaches viewers how to make a recipe

Once all 25 videos were gathered from the five hashtags, ten comments would be selected from each video. These comments were then again selected through a random selection process, where the range included 1 to X>10 (the number of comments on the video exceeding 10). Similarly towards the video selection, a problem that was often came across when searching for comments were irrelevant comments that provided nothing about the users' input. These comments included random phrases completely irrelevant towards the videos (Examples included: "I farted," ".," and "ketogenicdiet24") or mention towards other users. If these comments had come across after utilizing the random number generator, these comments were skipped, and another comment would be selected again. Additionally, comments embedded as comment threads were not considered as comments in these threads would generally follow the same polarity as the other comments. All comments analyzed were "first comments," being the first comment that starts a thread.

(Addresses number 9 of the edits. Mentions that comment threads were not utilized in the analyzation and solely the first

Table 2

Number of View per Video

------------------	Video #1	Video #2	Video #3	Video #4	Video #5	All Videos
Keto	1.2M	62.7K	454.5K	327.9K	248.6K	2.3M
Atkins	343.7K	2974	10.7K	112.8K	79.5K	549.7K
Mediterranea n	556K	13.2K	235.8K	3.6M	3.4M	7.8M
Vegan	166.6K	662.8K	82.4K	704.5K	96.8K	1.7M
Detox	132.9K	2.5M	831.8K	99.6K	1.1M	4.7M
------------------	-------------	-------------	-------------	-----------	-------------	17.55M

(Addresses half of number 1. This is a table detailing all of the view counts of each of the videos that I have analyzed)

After all 250 TikTok comments were gathered from all of the 25 videos, these comments were then inserted into MeaningCloud. MeaningCloud is a text analytic software that includes a variety of application programming interfaces or APIs that allow for analysis of different texts (MeaningCloud, 2023). The application that

will be utilized in MeaningCloud was MeaningCloud's Sentiment Analysis API, which allows for "a detailed, multilingual sentiment analysis on information from different sources" (MeaningCloud, 2023). The API would take each of the comments and sort them through five different categories: polarity, agreement, subjectivity, confidence, and irony. The polarities generarated included seven different values which were P+, P, NEU, N, N+, and None. In order to maximize the most amount of data results, ChatGPT was then utilized to analyze the comments classified as None to classify the other comments into different polarities which were the same as the one form MeaningCloud. Prompt that was used to classify was "(Comment) Analyze this comment by utilizing a sentiment analysis and categorize it by either P+, P, NEU, N, and N+." Once all the comments were analyzed, a single ANOVA statistical test was utilized in order to see the differences between the values of polarity between all of the five fad diets. Then a Post Hoc Tukey HSD was utilized as well to see the differences in polarity between each individual fad diet.

Results

Frequency of the Sentiment of Different Fad Diets

Legend: P+ (blue), P (red), NEU (yellow), N (green), N+ (orange)

Frequency (y-axis: 0, 5, 10, 15, 20)

Fad Diets (x-axis): Keto Diet, Mediterrean Diet, Detox Diet, Atkins Diet, Vegan Diet
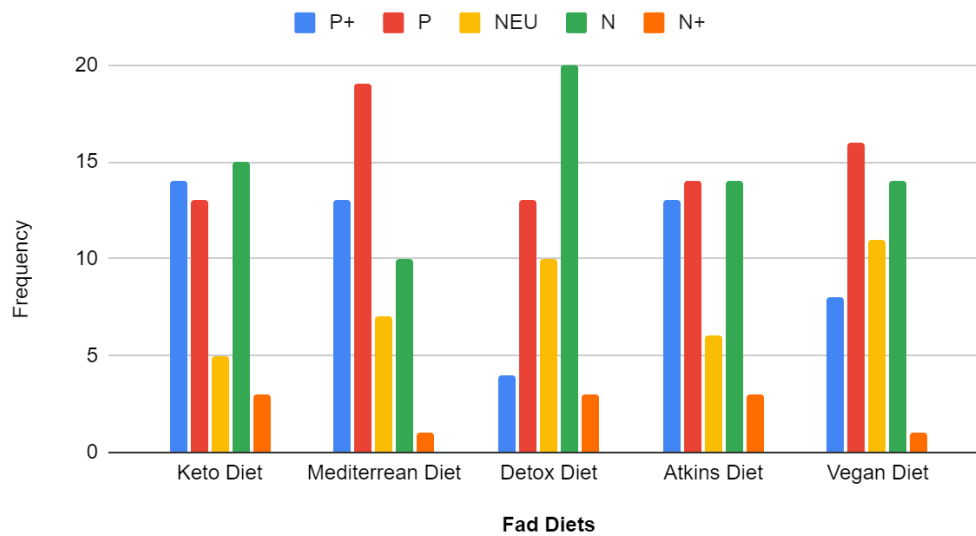
==Figure 2: The frequency of the sentiment of different fad diets throughout all of the 250 comments==

==**(Addresses number 5 and 2 of the edits. Redundancy is reduced as the paragraph below was removed as everything written could be interpreted by looking at the graph. Additionally, wording throughout the methodology page has been changed in order to make more sense. 5 videos from each hashtag, meaning a total of 25 videos with 10 comments analyzed from each. Meaning that there is a total of 250 comments totaled analyzed)**==

Table 3: The numbers of the sentiment of the comments throughout each of the hashtags

Fad Diets	P+	P	NEU	N	N+
Keto Diet	14	13	5	15	3
Mediterrean Die	13	19	7	10	1
Detox Diet	4	13	10	20	3
Atkins Diet	13	14	6	14	3
Vegan Diet	8	16	11	14	1

<mark>Atkins Diet</mark>

<mark>(Addresses comment 6 and 3. Figures 3-7 have now been manipulated out on a chart on word. These figures also display the full comments of the users).</mark>

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
my mom and dad went on it and they did lose a lot of weight…. however my mom did have to have triple bypass… so healthy	P+	AGREEMENT	OBJECTIVE	100	NONIRONIC
I could never give up carbs - bread and pasta are my fave	P	AGREEMENT	OBJECTIVE	100	NONIRONIC
I ate the snack bars at night when I had gestational diabetes It actually helped my blood sugar levels in the AM	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC
Somebody I used to work with did it - the smell of broccoli and cauliflower with	None	AGREEMENT	OBJECTIVE	100	NONIRONIC

cheese for breakfast still lingers in my brain					
I went on Atkins at one time and lost 30 lbs. I'm Southern so all our family events center around good food of all kinds. Lasted about 3 months.	N	DISAGREEMENT	SUBJECTIVE	94	NONIRONIC
I lose 60 pounds in high school, I never really ate Atkins products but it works! Not long lasting though.	N+	DISAGREEMENT	OBJECTIVE	94	NONIRONIC
My mom still tells me to eat these I hate the taste Omg	N	AGREEMENT	SUBJECTIVE	100	NONIRONIC
I think it depends on the blood type, O type is meat, A vegetarian ect. Also anything in the "industry" is for money. We can't win.	N	AGREEMENT	SUBJECTIVE	92	NONIRONIC
Been eating Atkins since 1999. It works	P	AGREEMENT	OBJECTIVE	100	NONIRONIC
ATKINS % WORKS!!!! I've lost over 30 lbs more than once on Atkinsa!	NEU	DISAGREEMENT	OBJECTIVE	94	NONIRONIC

Figure 3: Example of results provided by MeaningCloud for the 50 comments collected in the #AtkinsDiet hashtag. (Only 10 out of 50 Comments Shown)

In Figure 3, MeaningCloud analyzed that 13 out of 50 comments had an overwhelming positive polarity, 14 out of the 50 comments had a positive polarity, 6 comments had a neutral polarity, 14 comments had a negative polarity, and 3 comments had an overwhelming negative polarity when discussing Atkins Diet. Additionally, MeaningCloud analyzed that 27 out of 50 comments were written objectively, while 23 out of 50 comments were written subjectively. In total there was a 98.24% confidence in the accuracy of the sentiment analysis in terms of the comments. Overall, the polarity of the comments regarding the Atkins Diet were mostly positive. These comments that were deemed positive had an optimist view about the content they just watched, expressing gratitude towards the content creator. They would also encourage and praise the growth of the creator if it was a video about their progress in trying out the diet. In an outside perspective, if an individual who watched this video and scrolled through the comments, that person would be surrounded by positive reinforcement.

Keto Diet

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
We all tried to tell ya	P	AGREEMENT	OBJECTIVE	100	NONIRONIC

The fact that we tried for AGES TO TELL HER THIS	N	AGREEMENT	OBJECTIVE	100	NONIRONIC
I feel like keto is a temporary fix… long term isn't ideal I couldn't do it	N	AGREEMENT	OBJECTIVE	92	NONIRONIC
I just started my keto journey. Day 3 Week 4 I'm down 16 pounds. To me, this is one of the hardest things I've done	NEU	DISAGREEMENT	OBJECTIVE	94	NONIRONIC
To each their own. Everyone has to find what works for them. For me, Keto saved my life. 5 years and never going back.	P	AGREEMENT	OBJECTIVE	100	NONIRONIC

Even better lettuce wrapped	P+	AGREEMENT	SUBJECTIVE	98	NONIRONIC
I keep forgetting about egg salad !!	NEU	DISAGREEMENT	SUBJECTIVE	94	NONIRONIC
I love egg salad…I wrap it up in a large romaine leaf, same thing with chicken salad… YUM !…	P+	AGREEMENT	SUBJECTIVE	100	NONIRONIC
egg salad is going to be crucial in my diet now	P	AGREEMENT	SUBJECTIVE	100	NONIRONIC
I love pickles! Now I need to try it in egg salad	P+	AGREEMENT	SUBJECTIVE	100	NONIRONIC

Figure 4: Results provided by MeaningCloud for the 50 comments collected in the #Keto hashtag. (Only 10 out of 50 Comments Shown)

(Addresses number 5 of the edits. Redundancy is reduced as the sentence below was removed as everything written was repeated and unnecessary)

In Figure 4, MeaningCloud analyzed that 14 comments had an overwhelming positive polarity, 13 comments had a positive polarity, 5 comments had a neutral polarity, 15 comments had a negative polarity, and 3 comments had an overwhelming negative polarity out of 50 comments when discussing the Keto Diet. Additionally, MeaningCloud analyzed that 26 out 50 comments were written objectively, while 34 out of 50 comments were written subjectively. In total, there was a 98.2% confidence in the accuracy of the sentiment analysis in terms of the comments. Overall, the polarity of the comments regarding the Keto Diet were mostly positive. Most comments consisted of praise of recipes or the progress an individual made throughout their keto journey. These comments would also add on to the video, telling the creator other alternatives to improve upon the recipes, creating a community in these keto videos of positivity and encouragement.

Mediterranean Diet

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
It's just a way of eating… Mediterranean people and Middle Easterners eat this way. It's not a fad or trend. Hope	P	AGREEMENT	SUBJECTIVE	100	NONIRONIC

everyone enjoys!					
This all just sounds like a normal balanced diet	NEU	DISAGREEMENT	OBJECTIVE	94	NONIRONIC
I didn't realize I have a Mediterranean diet until now	N	AGREEMENT	OBJECTIVE	100	NONIRONIC
mediterranean food is so good	P	AGREEMENT	SUBJECTIVE	100	NONIRONIC
dairy in moderation??? nah we're literally eating yogurt as a side with everything	N	AGREEMENT	OBJECTIVE	100	NONIRONIC
I can get over veggies but I CANNOT do fish or seafood	NEU	DISAGREEMENT	OBJECTIVE	86	NONIRONIC
was recently diagnosed with MS & heard that an "anti inflammatory" diet might ease symptoms, this is very helpful & very organized video!!	P	DISAGREEMENT	OBJECTIVE	92	NONIRONIC

tysm!					
my favorite diet and after w lot of research also shows great benefits for hormone regulation and endometriosis	P+	AGREEMENT	SUBJECTIVE	98	NONIRONIC
What if you don't like seafood at all, like won't eat it. Suggestions? Chicken maybe?	P	AGREEMENT	SUBJECTIVE	100	NONIRONIC
Can you do a video of just cheese. Which ones are good and which aren't	P	AGREEMENT	SUBJECTIVE	100	NONIRONIC

Figure 5: Results provided by MeaningCloud of the 50 comments collected in the #MediterraneanDiet. (Only 10 out of 50 Comments Shown)

In Figure 5, MeaningCloud analyzed that 13 comments had an overwhelming positive polarity, 19 comments had a positive polarity, 7 comments had a neutral polarity, 10 comments had a negative polarity, and 1 comment had an overwhelming negative polarity out of the 50 comments when discussing the Mediterranean Diet. Additionally, MeaningCloud analyzed that 26 out of the 50 comments were written objectively, while 34 out of 50 comments were written subjectively. In total, there was a 98.96% confidence in the accuracy of the sentiment analysis in terms of the comments. Overall, the polarity of the comments regarding the Mediterranean Diet were mostly positive. Most of these comments consisted of expressing their love for the food of the Mediterranean diet and their willingness to attempt to try this diet in the future. They would also comment on other messages of positivity, expressing how much their families and themselves enjoyed the food when creating these recipes, setting a positive atmosphere around the Mediterranean dieting community.

Vegan Diet

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
Pea protein is the best for	P+	AGREEMENT	SUBJECTIV	100	NONIRONIC

u. Peas are super nutritious			E		
What am even supposed to eat then fam	N	AGREEMENT	SUBJECTIVE	100	NONIRONIC
Vegetarianism has made Sikhs weak!!! Please reintroduce jhatja	N	AGREEMENT	SUBJECTIVE	100	NONIRONIC
I live off plant based food lmao	P	AGREEMENT	OBJECTIVE	100	NONIRONIC
Are you a doctor bhaji?	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC
Can you do soya milk if yes please tag me	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC
Next pls tag me	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC
U made me love this	P+	AGREEMENT	SUBJECTIVE	100	NONIRONIC
Pls are you in Accra? I would like to purchase some	P	AGREEMENT	SUBJECTIVE	100	NONIRONIC
Pls what is in the pepper	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC

In Figure 6, MeaningCloud analyzed that 8 comments had an overwhelming positive polarity, 16 comments had a positive polarity, 11 comments had a neutral polarity, 14 comments had a negative polarity, and 1 comment had an overwhelming negative polarity out of the 50 comments when discussing the Vegan Diet. Additionally, MeaningCloud analyzed that 29 out of the 50 comments were written objectively, while 31 out of 50 comments were written subjectively. In total, there was a 96.86% confidence in the accuracy of the sentiment analysis in terms of the Detox Diet comments. Overall, the polarity of the comments regarding the Vegan Diet were mostly positive. Most of these comments consisted of praise and appreciation about the content they viewed. Individuals would comment about the foods they just saw and mentioned about the overall healthiness of these foods. They would also mention how these foods made them crave for them and how it made them want to follow through with these diets. Users also expressed their gratitude towards the content creator to keep sharing more.

Text	Polarit	Agreement	Subjectivity	Confidence	Irony

	y				
100% true I found out I had fattie liver and started detox natural Remedies and I've lost 58lb since 7/22♥	NEU	DISAGREEMENT	OBJECTIVE	94	NONIRONIC
The livers job is to detox isnt it	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC
My trainer made me do blood work before starting anything	P	AGREEMENT	OBJECTIVE	100	NONIRONIC
Do you just drink the smoothie for 6 weeks? And have meals too?	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC
This! but also focus on your mental health! Not many talk about this, and I lost 80lbs and this was the biggest contributor, and still is!	N	AGREEMENT	OBJECTIVE	100	NONIRONIC
i think detox is just what she calls her ed	N	AGREEMENT	SUBJECTIV	100	NONIRONIC

♀			E		
She looks tired. So very tired.	N+	AGREEMENT	SUBJECTIVE	98	NONIRONIC
she looks so empty and tired	N	AGREEMENT	OBJECTIVE	100	NONIRONIC
And she's just casually hooked up to a IV during this interview	N	AGREEMENT	OBJECTIVE	100	NONIRONIC
The second anyone says the word detox	N	AGREEMENT	OBJECTIVE	100	NONIRONIC

(Addresses number 5 of the edits. Redundancy is reduced as the sentence below was removed as everything written was repeated and unnecessary)

In Figure 7, MeaningCloud analyzed that 4 comments had an overwhelming positive polarity, 13 comments had a positive polarity, 10 comments had a neutral polarity, 20 comments had a negative polarity, and 3 comments had an

overwhelming negative polarity out of the 50 comments when discussing the Vegan Diet. Additionally, MeaningCloud analyzed that 20 out of the 50 comments were written objectively, while 30 out of 50 comments were written subjectively. In total, there was a 98.52% confidence in the accuracy of the sentiment analysis in terms of the comments. Overall, the polarity of the comments regarding the Detox Diet were mostly negative. As the only diet to consist of a mostly negative view, most of these comments consisted of questioning the type of content they watched. They expressed their discontent about the actual nutritional value of attempting this diet and were strongly against trying the Detox diet. They would also express how the content creator inside of these videos looked lifeless and tired.

Complete Sample Set

Throughout the 250 comments analyzed out of the five fad diets, MeaningCloud analyzed 52 comments of overwhelming positive polarity (20.8%), 75 comments of positive polarity (30%), 39 comments of neutral polarity (15.6%), 73 comments of negative polarity (29.2%), and 11 comments of overwhelming negative polarity (4.4%). Additionally, the software analyzed that 128 comments (51.2%) were written objectively, while 122 comments (48.8%) were written subjectively. From all of the comments analyzed, there was an average of 98.16% confidence in the results of the sentiment analysis.
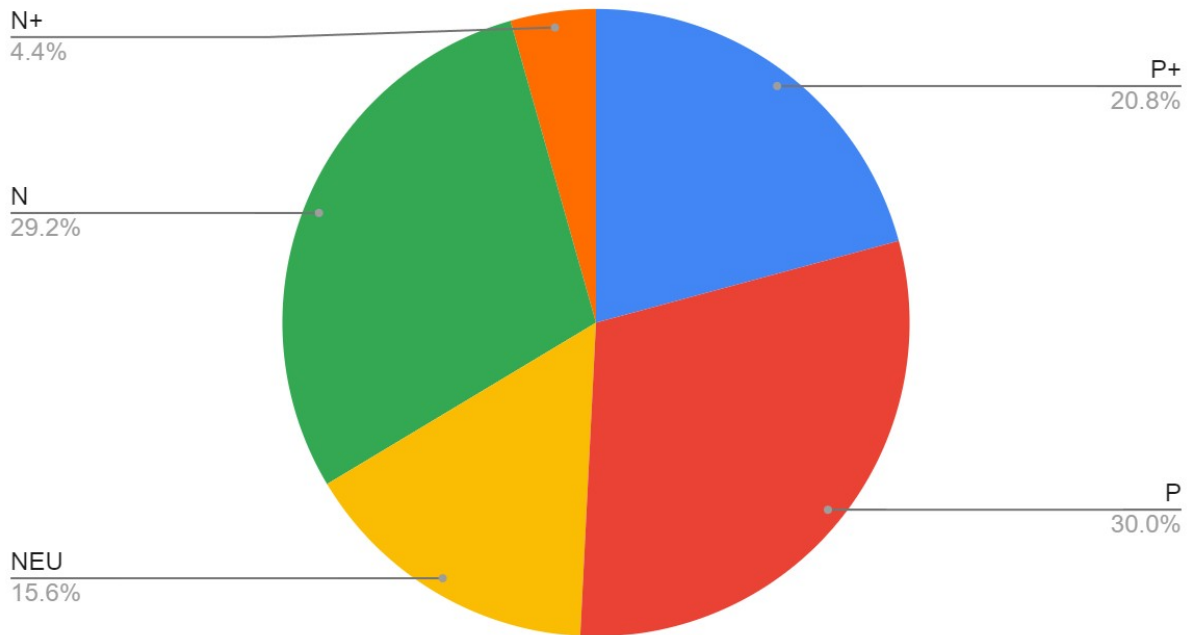
Percentage of All of the Polarity of Comments

N+
4.4%

N
29.2%

NEU
15.6%

P+
20.8%

P
30.0%

Figure 8: The percentage of all of the polarity of the 250 comments displayed in a pie chart.

Anova: Single Factor Statistical Test

After collecting all of the sample size and implementing MeaningCloud to conduct a sentiment analysis, an ANOVA: Single Fact test was utilized in order to see the difference between the values in polarity between all of the five fad diets. The p value that was obtained came out to be 0.000006737, a number less than 0.05, which makes the data statistically significant. This means that the null hypothesis is able to be rejected. Thus, since the average between the means for the different polarities across the five diets is significantly different than the average among means for the different polarities, there is a statistical difference between sentiments for different fad diets. This implies that the users perceive one fad diet to be significantly better (or worse) than another

F	P Value
15.38	6.74 * 10^-6

Figure 9: The F and p-Value retrieved from the ANOVA statistical test calculations (rounded to the nearest hundredth).

Pairwise Comparisons		$HSD_{.05} = 5.7091$ $HSD_{.01} = 7.1411$	$Q_{.05} = 4.2319$ $Q_{.01} = 5.2933$
$T_1:T_2$	$M_1 = 10.40$ $M_2 = 15.00$	4.60	$Q = 3.41$ ($p = .15312$)
$T_1:T_3$	$M_1 = 10.40$ $M_3 = 7.80$	2.60	$Q = 1.93$ ($p = .65702$)
$T_1:T_4$	$M_1 = 10.40$ $M_4 = 14.60$	4.20	$Q = 3.11$ ($p = .21949$)
$T_1:T_5$	$M_1 = 10.40$ $M_5 = 2.20$	8.20	$Q = 6.08$ ($p = .00288$)
$T_2:T_3$	$M_2 = 15.00$ $M_3 = 7.80$	7.20	$Q = 5.34$ ($p = .00934$)
$T_2:T_4$	$M_2 = 15.00$ $M_4 = 14.60$	0.40	$Q = 0.30$ ($p = .99953$)
$T_2:T_5$	$M_2 = 15.00$ $M_5 = 2.20$	12.80	$Q = 9.49$ ($p = .00001$)
$T_3:T_4$	$M_3 = 7.80$ $M_4 = 14.60$	6.80	$Q = 5.04$ ($p = .01483$)
$T_3:T_5$	$M_3 = 7.80$ $M_5 = 2.20$	5.60	$Q = 4.15$ ($p = .05617$)
$T_4:T_5$	$M_4 = 14.60$ $M_5 = 2.20$	12.40	$Q = 9.19$ ($p = .00002$)

Figure 10: The Post Hoc Tukey HSD calculations for the variables (T1=P+, T2=P, T3=NEU, T4=N, T5=N+).

In addition to the ANOVA test, Tukey's HSD (honestly significant difference) was calculated within the ANOVA data. This procedure facilitates pairwise comparison between the independent variables and provides information on whether or not there is a significant difference between the variables. The calculations demonstrates that there was a significant difference between T1:T5 with a 0.00288 p value, T2:T3 with a p value of 0.00934, T2:T5 with a p value of 0.00001, T3:T4 with a p value of 0.01483, and T4:T5 with a p value of 0.00002. All of these numbers are less than 0.05, which means that the null hypothesis is able to be rejected. The comparison between all of these variables demonstrates that there is a statistical difference between these independent variables, meaning that users have variations in sentiment depending on the type of fad diet.

Discussions

From the sentiment analysis of the 250 comments gathered from the five different fad diets, it is evident that there exists a disparity between the polarity of the comments. For all of the comments from all of the different fad diets, the majority of the comments contain a positive polarity, followed by a negative polarity, then a neutral polarity. This finding is reinforced by the p value obtained by the results of the ANOVA: Single Statistical Test and the Post Hoc Tukey's HSD calculations.

Depending on the popularity of the fad diet, there is a clear difference between the polarity of the comments. For example, the Keto Diet, the diet which is associated with the greatest number of views in the hashtag had less negative polarity (36%) compared to the Detox Diet (46%), a diet that had a smaller number of views compared to the Keto Diet. These results show that the more popular (more posts and views) the diet, the more positive sentiment

is correlated with it. This is important to understand because hashtags that have more posts have higher positive sentiment, meaning that there is constant reinforcement of positivity of these fad diets. From the comments analyzed, most of them consisted of praise and approval of the diets, showing their willingness to attempt to try these diets. These users would also comment on the overall body of the content creator and recipes, being impressed with the results and taste. These comments create a positive sense of community towards individuals scrolling through the comments of these videos within these dieting videos (not including detox diet). From the phenomenon founded by Zheng, where he uncovered in online spaces, positive reinforcement has a strong influence on its users, the overall positivity within these dieting communities will increase the tendency of users to try these fad diets due to constant positive reinforcement (Zheng et. et al, 2013).

Adding on to this phenomenon, in a study conducted by Oh, she found that the positive sentiment of users is able to increase the tendency of users to share content towards other users (Oh et. al, 2022). In relation to the studies conducted in this research, the positive sentiment of users regarding fad diet content on Tik Tok will cause more interaction with this content. All of these factors can lead towards more users developing a negative body image, unhealthy eating habits and increased mental health issues, which are all detrimental health effects that can increase the chance of death (Minadeo et. al, 2023). This becomes a major problem when accounting the prevalence of inaccurate nutritional information and the lack of understanding of the inaccurate information on TikTok of users, as it is able to cause users to adopt incorrect eating patterns with no benefits that harm their overall health (Anderson, 2020). Connecting with the overall negative

effects of fad diets, users need to start being aware of the harmful implementation of adopting fad diets and understand correct nutritional information to avoid harming their health. This is especially significant to consider when a majority of the users on Tik Tok are adolescents or children. Compared to adults, these younger audiences are more likely to adopt these eating patterns as they constantly surround themselves with these types of content and have a more desire to fit in with societal norms (Mordzejewska et al., 2022; Law and Jevons, 2023). They feel pressured to change their body in order to fit in with the glorified body image encouraged on social media (Hsu, 2023). This is important to understand because ultimately after adopting these eating patterns and the body these users are trying to strive for isn't present, both the mental and physical health of these users fall immensely (Tahreem et. al, 2022). However, this was only an issue with the diets that had a positive sentiment

regarding them. Only in the Detox diet hashtag (mostly negative polarity) were users questioning the actual validity of nutritional content that they were presented. This means that in regards to content that has higher negative sentiment, people were more aware and questioned the actual validity of the information provided. Example of these comments include "The second anyone says the word detox

" and Distilled water is not for drinking guys!". Overall, these results from this study demonstrates the influence TikTok can have on its young users in fad diet content, through the sentiment found from the analysis of the 250 comments.

Conclusion

This research found that out of 250 TikTok comments collected from 5 different fad diet hashtags, around half of the users had a positive polarity, one third of users had a negative polarity, and around fifteen percent of users had a neutral polarity. These

results show that the collective views of fad diet content on TikTok is generally positive. Additionally, the p-Value obtained from the Anova Single Factor Statistical Test proved that the data of the sentiment analysis was statistically significant, reinforcing the polarity found among the TikTok comments. It is concerning that the numerous fad diet content on TikTok that is being promoted is perceived as positive despite the detrimental health risks that they pose. The young audience that interacts with this content that struggle to maintain their body weight and strive for the body that social media promotes are frequently engaging and sharing media to other users. This ends up not only harming themselves, but also other users, exacerbating the influence these fad diet videos have on TikTok.

However, there exists limitations towards the overall research process. MeaningCloud, the application utilized to analyze the comments may be not accurate.

There was a high accuracy score throughout all the 250 comments, averaging a total of 98.16%, however, the machine could have been inaccurate from the incorrect analysis of polarity. When looking at the comments and the analysis provided by MeaningCloud, there were some instances when there were discrepancies. MeaningCloud provided the wrong polarity sometimes as it wasn't able to pick up the context of the situation or certain human-like aspects like humor when manually analyzing through the comments. Similarly to MeaningCloud, ChatGPT has similar issues. As an artificial intelligence chatbot that utilizes a natural language processing model, it could not pick up on certain human-like tools such as irony or pick up the context of the situation for the comments. Additionally, although a random selection and an inclusion criterion was utilized for analysis, comments from users varied from all different levels of experience: inexperienced and experienced.

A person inexperienced would be an individual with no prior knowledge of fad diets or someone who had never incorporated one in their life. A person experienced would be an individual who had tried the fad diet prior to watching the video. Most comments out of the 250 comments seemed to be more experienced than inexperienced, which could have an impact on the polarity due to having experience in the fad diets already. This was mostly demonstrated by the prevalence of questions left by inexperienced users, which provides a more neutral polarity. While experienced users would generally tend to always lean towards a positive or negative polarity due to undergoing adopting these eating habits in their lifestyle. All of these factors overall could have skewed the results of the research process due to the fact that if all of the comments selected for a video generally consisted of inexperienced users, the polarity would be more neutral, only accounting for one side of the audience. While for the other side, if the comments consisted of only experienced users, the polarity would shift towards either a positive or negative polarity. This would mean that the sentiment of the users would only account for half of the audience.

Another limitation of this research is the small sample size. Tik Tok approximately has 150 million users, with 63% of teenagers reporting usage, equating to around 94.5 million adolescent users. However, since the study only analyzed 250 comments–representing 250 users' sentiment on five different fad diets–which is insufficient given the low number of comments analyzed. In total, all of the videos combined had around 17.55 million views, but for statistically significant results, at least 385 comments would need to be analyzed. Additionally, the small sample size would result in a margin of error of 6.2%, limiting the confidence level to 90%.

Thus, the study is statistically underpowered due to the low sample size.

(Addresses comment #1. I identified the problem of the small sample size and the limitation it proposes)

Overall, this research is able to provide new research towards TikTok fad diet content. It provides data on the sentiment analysis of TikTok comments on fad diet videos, allowing other researchers to understand the polarity between the content and the users. As it was mostly positive, younger users on TikTok are more likely to be vulnerable to the influence of fad diet content. This positive reaction will provide more interactions among these users and needs to be addressed in order to help the health of the younger audience through the expanding usage of TikTok in the following years. Future research that could happen to address this problem is researching the credibility of content creators regarding fad diet content or fact checking recipes on TikTok in order to reduce the impacts of fad diet content on its users. Another way to expand on this research is to utilize human analysis rather than relying on AI or other text analysis tools in order to obtain more accurate results from the sentiment of users. Similarly, increasing the sample size of the entire study is able to expand on the research in order to provide more statistically significant results.

References

(8. Work Cited Page has been changed towards references and has live links and numbers in order when each source was utilized)

[1] CDC. (2021, June 7). *Obesity is a Common, Serious, and Costly Disease*. Centers for Disease Control and Prevention. https://www.cdc.gov/obesity/data/ adult.html#:~:text=Obesity%20is%20a %20common%2C%20serious%2C%20and

%20costly%20disease&text=Obesity %2Drelated%20conditions%20include %20heart

[2] Tahreem, A., Rakha, A., Rabail, R., Nazir, A., Socol, C. T., Maerescu, C. M., & Aadil, R. M. (2022). Fad Diets: Facts and Fiction. *Frontiers in Nutrition*, *9*(9). https://doi.org/10.3389/fnut.2022.960922

[3] Teng, Y., Huang, S.-W., Li, Z., & Xie, Q.-M. (2020, April). *Seasonal variation and trends in the Internet searches for losing weight: An infodemiological study*. ResearchGate. https://www.researchgate.net/publication/34 0956362_Seasonal_variation_and_trends_in _the_Internet_searches_for_losing_weight_ An_infodemiological_study

[4] Modrzejewska, A., Czepczor-Bernat, K., Modrzejewska, J., Roszkowska, A., Zembura, M., & Matusik, P. (2022).

#childhoodobesity – A brief literature review of the role of social media in body image shaping and eating patterns among children and adolescents. *Frontiers in Pediatrics*, *10*. https://doi.org/10.3389/fped.2022.993460

[5] Minadeo, M., & Pope, L. (2022). Weight-normative messaging predominates on TikTok—A qualitative content analysis. *PLOS ONE*, *17*(11), e0267997. https://doi.org/10.1371/journal.pone.026799 7

[6] Hsu, M. S. H., Rouf, A., & Allman-Farinelli, M. (2018). Effectiveness and Behavioral Mechanisms of Social Media Interventions for Positive Nutrition Behaviors in Adolescents: A Systematic Review. *Journal of Adolescent Health*, *63*(5), 531–545. https://doi.org/10.1016/j.jadohealth.2018.06. 009

[7] Mills, J. S., Minister, C., & Samson, L. (2022). Enriching sociocultural perspectives on the effects of idealized body norms: Integrating shame, positive body image, and self-compassion. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.983534

[8] Khawandanah, J., & Tewfik, I. (2016). Fad Diets: Lifestyle Promises and Health Challenges. *Journal of Food Research*, *5*(6), 80. https://doi.org/10.5539/jfr.v5n6p80

[9] Kurnialandi, A., Gamelia, E., & Masfiah, S. (2023). The Effect of Tiktok Usage Behavior on Body Image in Jenderal Soedirman University Students. *JURNAL IPTEKKOM (Jurnal Ilmu*

[10] *Eating Disorders Coalition: Facts About Eating Disorders*. (n.d.). Eatingdisorderscoalition.org. https://eatingdisorderscoalition.org/inner_template/facts_and_info/facts-about-eating-disorders.html

[11] TikTok. (2023, March 21). *Celebrating our thriving community of 150 million Americans*. Newsroom | TikTok. https://newsroom.tiktok.com/en-us/150-m-us-users

[12] Vogels, E. A., Gelles-Watnick, R., & Massarat, N. (2022, August 10). *Teens, Social Media and Technology 2022*. Pew Research Center. https://www.pewresearch.org/internet/2022/08/10/teens-social-media-and-technology-2022/

[13] Oh, H., Goh, K.-Y., & Phan, T. Q. (2022). Are You What You Tweet? The Impact of Sentiment on Digital News Consumption and Social Media Sharing.

Information Systems Research, *34*(1). https://doi.org/10.1287/isre.2022.1112

[14] Zheng, M., Lü, L., & Zhao, M. (2013). Spreading in online social networks: The role of social reinforcement. *Physical Review E, 88*(1). https://doi.org/10.1103/physreve.88.012818

[15] *MeaningCloud*. (2015). MeaningCloud. https://www.meaningcloud.com/

[16] Courtney, A. (2020, March 6). *Self-perceived nutrition knowledge vs. actual nutrition knowledge and willingness to participate in fad diets*. Tdl.org. https://baylor-ir.tdl.org/items/efd9bbd4-7ccd-4b97-9500-ed3e45b0ca3e

[17] Law, R. M., & Jevons, E. (2023). Exploring the perceived influence of social media use on disordered eating in nutrition and dietetics students. *Journal of Human Nutrition and Dietetics*, *36*(5). https://onlinelibrary.wiley.com/doi/10.1111/jhn.13212

Thank you for addressing my comments. However, merely stating that the study is statistically underpowered as a limitation does not justify (or warrant) publication. You will either need to re-work this research from the drawing board or introduce an entirely different set of statistical parameters (incrase the value of p and decrease the confidence interval) such that most of this data will need to be re-analyzed. I suspect that the results will be different as well. Please re-visit my earler comments, then change the statistical parameters for p and confidence intervals to match your sample size. Re-analyze the data using these statistical parameters and report the results accordingly.

The bolded will be the changes that I have made towards the addressed comments and the reasoning of these changes will be below the document.

Conclusion

This research found that out of 250 TikTok comments collected from 5 different fad diet hashtags, around half of the users had a positive polarity, one third of users had a negative polarity, and around fifteen percent of users had a neutral polarity. These results show that the collective views of fad diet content on TikTok is generally positive. Additionally, the p-Value obtained from the Anova Single Factor Statistical Test proved that the data of the sentiment analysis was statistically significant, reinforcing the polarity found among the TikTok comments. It is concerning that the numerous fad diet content on TikTok that is being promoted is perceived as positive despite the detrimental health risks that they pose. The young audience that interacts with this content that struggle to maintain their body weight and strive for the body that social media promotes are frequently engaging and sharing media to other users. This ends up not only harming themselves, but also other users, exacerbating the influence these fad diet videos have on TikTok.

However, there exists limitations towards the overall research process. MeaningCloud, the application utilized to analyze the comments may be not accurate. There was a high accuracy score throughout all the 250 comments, averaging a total of 98.16%, however, the machine could have been inaccurate from the incorrect analysis of polarity. When looking at the comments and the analysis provided by MeaningCloud, there were some instances when there were discrepancies. MeaningCloud provided the wrong polarity sometimes as it wasn't able to pick up the context of the situation or certain human-like aspects like humor when manually analyzing through the comments. Similarly to MeaningCloud, ChatGPT has similar issues. As an artificial intelligence chatbot that utilizes a natural language processing model, it could not pick up on certain human-like tools such as irony or pick up the context of the situation for the comments. Additionally, although a random selection and an inclusion criterion was utilized for analysis, comments from users varied from all different levels of experience: inexperienced and experienced. A person inexperienced would be an individual with no prior knowledge of fad diets or someone who had never incorporated one in their life. A person experienced would be an individual who had tried the fad diet prior to watching the video. Most comments out of the 250 comments seemed to be more experienced than inexperienced, which could have an impact on the polarity due to having experience in the fad diets already. This was mostly demonstrated by the prevalence of questions left by inexperienced users, which provides a more neutral polarity. While experienced users would generally tend to always lean towards a positive or negative polarity due to undergoing adopting these eating habits in their lifestyle. All of these factors overall could have skewed the results of the research process due to the fact that if all of the comments selected for a video generally consisted of inexperienced users, the polarity would be more neutral, only accounting for one side of the audience. While for the other side, if the comments consisted of only experienced users, the polarity would shift towards either a positive or negative polarity. This would mean that the sentiment of the users would only account for half of the audience.

==Another limitation of this research is the small sample size. Tik Tok approximately has 150 million users, with 63% of teenagers reporting usage, equating to around 94.5 million adolescent users. However, since the study only analyzed 250 comments–representing 250 users' sentiment on five different fad diets–which is insufficient given the low number of comments analyzed. In total, all of the videos combined had around 17.55 million views, but for statistically==

Another limitation of this research is the set of statistical parameters set. This was mainly a problem in the margin of error as it was set to 6.2%, which is significantly greater than the usual parameters set for a statistical set. A greater margin of error indicates a wider range of uncertainty regarding the reported values founded by the statistical test, meaning that the true values can differ. This increased variability can obscure the precision of the findings and leave it to be vague to draw definite conclusions.

Overall, this research is able to provide new research towards TikTok fad diet content. It provides data on the sentiment analysis of TikTok comments on fad diet videos, allowing other researchers to understand the polarity between the content and the users. As it was mostly positive, younger users on TikTok are more likely to be vulnerable to the influence of fad diet content. This positive reaction will provide more interactions among these users and needs to be addressed in order to help the health of the younger audience through the expanding usage of TikTok in the following years. Future research that could happen to address this problem is researching the credibility of content creators regarding fad diet content or fact checking recipes on TikTok in order to reduce the impacts of fad diet content on its users. Another way to expand on this research is to utilize human analysis rather than relying on AI or other text analysis tools in order to obtain more accurate results from the sentiment of users. Similarly, increasing the sample size of the entire study is able to expand on the research in order to provide more statistically significant results.

Similarly, for future research, conducting the research with a lower margin of error is able to enhance on the research by providing clearer results and solidifying the reliability of the findings.

Thank you for addressing my comments. However, you may have misunderstood the statistical analysis. I have made extensive changes to the manuscript. Please work with the file attached to further revise it per the comments below

1.need version of chat gpt and the default hyperparameters
2.Need a brief discussion on what these diets are and what they contain (under introduction)
3.The discussion section can have more impact with regard to analysis of the data. Please think of more ways to extract meaningful information out of the data. For example, I have included Table 8. Is there any more information that can be extracted?
4.References should be numbered in sequential order in the text of the manuscript. Those numbers should correspond with the numbers in the References section of the manuscript.
I look forward to your revisions.

A Sentiment Analysis to investigate the sentiment of users on fad diet content on Tik Tok

Cho B

Abstract

Obesity has increased significantly in the past few decades. People have utilized social media in order to share nutritional information which enabled them to lose weight. This information includes 'fad diets', which are typically described and claimed as quick and easy methods to lose weight, but are not accompanied by robust scientific evidence to support those claims. Fad diet content creators are motivated to share their weight loss results as a way to grandstand and provide guidance, to obtain vindication and to connect with like-minded individuals who have achieved similar results using the same fad diet, and to obtain followers. The objective of this study was to find if the fad diet content on Tik Tok could influence adolescent users. The study utilized a sentiment analysis and analyzed 250 TikTok comments from five different popular fad diet hashtags. Ten comments were selected from each video with 5 Tik Tok videos being selected for each hashtag. The hashtags selected originated from the greatest number of views. An inclusion criterion was created in order to reduce the number of skewed data. The study found that 50.8% of comments were overwhelmingly positive and generated positive reactions, 33.6% of comments were overwhelmingly negative and generated negative reactions, and 15.6% of comments were neutral and generated neutral reactions. Followers of fad diet content are generally adolescents, who are receptive to suggestion, insecure about their body image, want fast results and generally cannot distinguish between anecdotal and scientific evidence. The negative impact and detrimental effects of fad diet content can therefore be easily permeated and disseminated using the large reach of this social media platform throughout this susceptible audience.

Keywords

Bryan Cho, Bergen County Technical High School, 275 Pascack road, Paramus, NJ 07652, USA.
210bryancho@gmail.com

Introduction

Prevalence of obesity

Obesity is a disorder where an individual has "weight that is higher than what is considered healthy for a given height (CDC, 2023)[1]. Throughout recent years, the US obesity prevalence

rate has increased: from 1999 through 2020, the US obesity prevalence increased from 30.5% to 41.9%. Additionally, during the same time period, the prevalence of severe obesity increased from 4.7% to 9.2% (CDC, 2023) [1]. Comorbidities accompanying obesity include heart disease, stroke, type 2 diabetes, and certain types of cancer, which are the leading causes of preventable, premature death (CDC, 2023) [1]. There is significant and growing interest in dieting (Tahreem et. Al, 2022) [2] because of the various permutations and combinations of food categories (fats, carbohydrates, proteins, dairy, fiber, minerals, water etc.) that are possible and adoptable at will without needing a physician's prescription. The results can be easily measured at home by weighing oneself and the permutations/combinations can be readily changed if the weight loss does not meet the dieter's expectations – therefore the 'fad' moniker. Teng et al. found that internet searches related to weight loss increased significantly from 2004 to 2018 (Teng et al., 2020) [3]. These people believe that adopting these diets into their lifestyle is their way to solve their long term problems of weight and body image. However, the fad diets that are prevalent on social media as a means to reverse or prevent obesity exploit users by often encouraging un-natural eating habits in order to meet unachievable body images (Mordzejewska et. al, 2022) [4].

Fad diets
A fad diet is a weight loss plan that utilizes specific nutritional content in order to lose weight rapidly (Tahreem et. al, 2022) [2]. These diets have frequently not been rigorously scientifically researched, and end up providing followers with less calories and nutrients, or with unhealthy and unnatural ratios of food groups, or macro-to-micronutrients, with unpredictable, deleterious metabolic consequences; which may include weight-loss (Tahreem et. al, 2022) [2]. Although not all fad diets may be downright unhealthy, the potential long term consequences of these diets are still not clear (Tahreem et. al, 2022) [2]. In social media, fad diets are popularized, influencing individuals to partake in them to improve their body image or to prevent obesity. This has caused a large base of users to have disproportionate exposure to an equally large number of influencers and weight/food related content. This in turn causes individuals to be "at risk of having internalized body image and disordered eating behaviors" (Minadeo et. al, 2022) [5]. Interacting with this type of content also causes individuals to develop a glorification of weight loss, causing them to resort to "maladaptive measures [such as] very restrictive diets, use of laxatives, [and] voluntary induction of vomiting" (Mordzejewska et al., 2022) [4]. A large number of users and followers of such diets are adolescents and/or children. These younger audiences are more susceptible towards developing eating patterns due to peer pressure and trying to fit in with society's image of a perfect body (Hsu, 2023) [6]. They want to obtain the ideal body image that is glorified on social media. If they cannot, it leads to feelings of inferiority, depression, and low self esteem (Mills et. al, 2022) [7]. Additionally, these methods of losing weight rapidly have been correlated with many health risk factors such as heart disease, cancer, diabetes, increased LDL cholesterol as well as reduced muscle and energy (Khawandanah, 2016[8]; Kurnialandi, 2023) [9]. All of these factors contribute to the high number of deaths correlated with eating disorders, being highlighted as the second leading cause of death by the Eating Disorders Coalition (EDC, 2019) [10]. The negative implications of fad diets on social media usage like Instagram and Snapchat are well documented. However, less in known about how and to what extent these fad diets negatively influence adolescents on the social media app, Tik Tok.

Tik Tok

There are currently ~ 150 million users on Tik Tok (TikTok, 2023) [11]. In a survey conducted by Pew Research, ~ 63% of teenagers ages 13 to 17 in the United States have reported using Tik Tok. 78% of those same teenagers in the same demographic have also reported utilizing Tik Tok several times a day or almost constantly (Pew Research Center, 2023) [12]. With Tik Tok being a large part of a majority of teenagers' lives in the United States, these teenagers constantly interact with the variety of content available on Tik Tok. This variety includes the popular rise of nutritional and health content specifically regarding fad diets. These videos typically accumulate ~ millions of views with most pushing unhealthy eating habits onto their audience. Examples include #keto – 13 billion views, #detoxdiet – 20 million views, and #mediterraneandiet – 243 million views.

Objective of research
Several studies in the public domain demonstrate a negative correlation between fad diets and users' health. However, there is considerably less research and information available on how exactly users perceive this type of content on the social media app. Tik Tok. In an attempt to determine the perception of Tik Tok users on fad diet content, this study utilized a sentiment analysis in order to understand the reactions of users by analyzing their comments. It is important to understand how these users react towards fad diet content on social media in order to obtain a better understanding of the impact that these fad diets can have. Oh et al. found that depending on the polarity of the sentiment of users, the propensity to share content increased. Consequently, the interactions of users with fad diet content increased (Oh, 2022) [13]. Additionally, the general view of fad diets can be identified in order to find if there is a constant positive reinforcement of these dietary patterns, which can lead to more users adopting these potentially harmful diets (Zheng et. al, 2013) [14]. This research collected 250 comments from 5 popular fad diet hashtags on Tik Tok and determined the reactions of these comments using a sentimental analysis.

Five Fad Diets
These five fad diets that will be researched are the Atkins, Ketogenic, Mediterranean, Vegetarian, and Detox diet. In the Atkins diet, it is a diet that consists of low carbohydrates to achieve weight loss. It primarily focuses on consuming fats and protein, consisting of foods like fish, meats, and avocados (Norhalila and Khadijah, 2016) [15]. Similarly, in the Ketogenic diet, it focuses on low carbohydrates and high amounts of fats to achieve a state of ketosis. The diets consist of fats like avocado, yogurt, and coconuts (Raggi and O'Neill, 2020)[16]. The Mediterranean diet focuses on consuming food in countries that surround the Mediterranean Sea. Specifically, it focuses on healthy food, emphasizing healthy fats, plant-based food, and proteins like olive oil, nuts, or fish (Davis et al., 2015) [17]. The Vegetarian diet consists solely of consuming plant-based foods, including fruits, vegetables, and nuts (Marsh et al., 2011) [18]. The final diet, the Detox diet is a diet that focuses on removing the toxins from the body through consuming liquids like smoothies, broths, or water (Klein and Kiat, 2014) [19].

Methods
In social media apps, hashtags are used to classify videos by certain categories. In Tik Tok specifically, content creators incorporate hashtags in the videos they create in order to categorize their content through a word or phrase. In this study, in order to collect the comments of users specifically directed toward fad diet content, hashtags were collected based off of popular fad

diets that are present on Tik Tok. These popular fad diets were based on Aaiza Tahreem's study, a researcher in the National Institute of Food Science and Technology (Tahreem et. Al, 2022) [2]. These fad diets which were all promoted to be a quick way to lose weight include the Atkins, Ketogenic, Mediterranean, Vegetarian, and Detox Diet. A total of five hashtags were collected. These hashtags were then based off of the most popular hashtags on the search bar in Tik Tok. Each fad diet was written into Tik Tok's search bar and the hashtag with the most total views were collected for video collection. Only one exception was made, which was the Atkins Diet hashtag as the videos listed on the hashtag were in different languages. In this case, the second most viewed hashtag was utilized instead, since English was primarily the main language to be utilized in these videos to understand the context of the video, comments, and to be able to cross-check the analyses.

Table 1. List of fad diet hashtags

Fad diets	Hashtags	View count (M. million. B.
Atkins Diet	#atkinsdiet	10M
Ketogenic Diet	#keto	13.1B
Mediterranean Diet	#mediterraneandiet	243.3M
Vegetarian Diet	#vegetariandiet	7.2M
Detox Diet	#detoxdiet	19.7M

After collecting the hashtags, a random selection method was then utilized in order to select ten videos from each hashtag. The random selection was utilized on Google and had a range from 1 through 100. A total of 5 videos were collected from each hashtag, totaling up to a total of 25 videos from all five hashtags. However, a problem that existed with the hashtag feature was that often videos that were tagged with a hashtag did not discuss the topic of the hashtag. Users would either include a lot of hashtags in their videos where they would not discuss the entirety of the hashtags or include a few to reach out towards specific audiences or incorporate the wrong hashtags. In order to circumvent this problem, only those videos were selected whose hashtag language fit into the codes developed by Marisa Minadeo (Table 2). In her research, Minadeo developed codes for food, nutrition, and weight-related posts that were popular on TikTok. This type of content forms core aspects of the fad diet content. When collecting the videos, a code from Minadeo's research had to match the video chosen. For example, if there was a video about the Keto diet, where the content creator discussed a recipe from the Keto diet, this would match with the "Food" code. This would mean that the video would be suitable to collect comments for analysis. Additionally, another requirement for video selection was that the video needed to have > 10 comments.

Table 2. List of codes from Marisa Minadeo

Codes	Definitions
Nutritional Advice	Creator provides nutrition guidance or beliefs

Food	Food is present in video
Body Image	Body image is discussed or portrayed in the video
Health	Video contains the hashtag health or the creator discusses a health behavior
Diet	Portrays or references a diet such as keto, paleo, intermittent fasting, weight watchers, Atkins, etc.
Eating disorder promotion	Video glorifies an eating disorder or gives strategies for perpetuating the eating disorder
Eating disorder recovery	Video shows recovery steps or encourages recovery from an eating disorder
Health halo	A food is glorified for its health qualities such as salad or granola
Calories	Creator mentions calories
Weight loss	Creator mentions weight loss
Physical activity	Video portrays or mentions physical activity including dance
Weight Bias/Fat Stigma	Video explicitly combats weight bias/fat stigma by explaining the negative impacts of weight bias, or how to stop bias towards fat people and weight gain from occurring

Video perpetuates weight bias/fat stigma by displaying dislike or assigning negative attributes towards fat people or gaining weight. |
| Culinary | Video teaches viewers how to make a recipe |

Once all 25 videos were collected from the five hashtags, ten comments were selected from each video. These comments were again selected by a random selection process, where the range included 1 to X > 10 (the number of comments on the video exceeding 10). Similar to the video selection, a problem that was often encountered when searching for comments was that there existed irrelevant comments which provided no informtion about the users' input. These comments included random phrases completely irrelevant to the videos (Examples included: "I farted," ".," and "ketogenicdiet24") or a mention towards other users. If these comments were encountered when utilizing the random number generator, that particular comment was skipped. Additionally, comments embedded as comment threads were not considered because comments in these threads would generally be expected to follow the same polarity as the first or originator comment. Thus, all the comments analyzed were "first comments," being the first comment that started a thread.

Table 3. Number of views per video (K=thousand, M=million)

------------------	Video #1	Video #2	Video #3	Video #4	Video #5	All Videos
Keto	1.2M	62.7K	454.5K	327.9K	248.6K	2.3M
Atkins	343.7K	2974	10.7K	112.8K	79.5K	549.7K
Mediterranean	556K	13.2K	235.8K	3.6M	3.4M	7.8M
Vegan	166.6K	662.8K	82.4K	704.5K	96.8K	1.7M
Detox	132.9K	2.5M	831.8K	99.6K	1.1M	4.7M
-----------------	-------------	-------------	-------------	-----------	-------------	17.55M

After all the 250 TikTok comments were collected from the 25 videos, these comments were then inserted into MeaningCloud. MeaningCloud is a text analytic software that includes a variety of application programming interfaces or APIs that allow for analysis of different texts (MeaningCloud, 2023) [20]. The application that was utilized in MeaningCloud was MeaningCloud's Sentiment Analysis API, which allows for "a detailed, multilingual sentiment analysis on information from different sources" (MeaningCloud, 2023) [20]. The API would take each of the comments and sort them in five different categories: polarity, agreement, subjectivity, confidence, and irony. The polarities generated included seven different values; P+, P, NEU, N, N+, and None (+=overwhelmingly, P=positive, N=negative, NEU=neutral). In order to maximize the most amount of data results, ChatGPT was then utilized to analyze the comments classified as None to re-classify them into one of the different polarities which were the same as the one from MeaningCloud. The version that was utilized was ChatGPT 3.5 and the parameters were all set on default settings. The prompt that was used to classify was "(Comment) Analyze this comment by utilizing a sentiment analysis and categorize it by either P+, P, NEU, N, and N+." Once all the comments were analyzed, a single ANOVA statistical test was run in order to determine if there was any statistical difference between the values of polarity among all of the five fad diets. Subsequently, a Post Hoc Tukey HSD was utilized as well to determine if there were statistical differences in polarity between pairs of fad diets.

Statistical analysis
Assuming an adolescent population of 42 million, a confidence interval of 95% and a sample size of 250, yielded a margin of error of 6.2%. Therefore, the results obtained could not be more precise than ± 6.2%, when translating from the population to the sample.
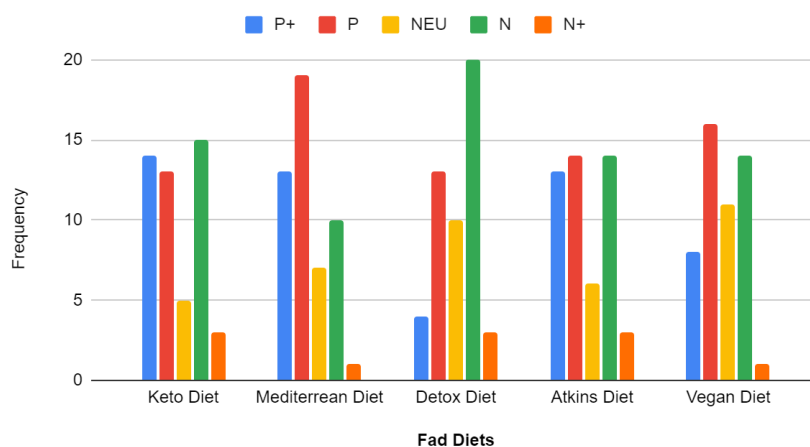
Results

Figure 2. The frequency of the sentiment of different fad diets for all of the 250 comments

Table 4. The numbers of the sentiment of the comments for each of the hashtags for the sample of 250 responses

Fad diets	P+	P	NEU	N	N+

Fad diets					
Keto diet	14	13	5	15	3
Mediterranean diet	13	19	7	10	1
Detox diet	4	13	10	20	3
Atkins diet	13	14	6	14	3
Vegan diet	8	16	11	14	1

Table 5. The numbers of the sentiment ± 6.2% margin of error of the comments for each of the hashtags adjusted for the entire population of 42 million adolescents

Fad diets	P+	P	NEU	N	N+
Keto diet	13.1. 14. 14.9	12.2. 13. 13.8	4.7. 5. 5.3	14.1. 15. 15.9	2.8. 3. 3.2
Mediterranean diet	12.2. 13. 13.8	18. 19. 20	6.6. 7. 7.4	9.4. 10. 10.6	0.94. 1. 1.06
Detox diet	3.8. 4. 4.2	12.2. 13. 13.8	9.4. 10. 10.6	18.8. 20. 21.2	2.8. 3. 3.2
Atkins diet	12.2. 13. 13.8	13.1. 14. 14.9	5.6. 6. 6.4	13.1. 14. 14.9	2.8. 3. 3.2
Vegan diet	7.5. 8. 8.5	15. 16. 17	10.3. 11. 11.7	13.1. 14. 14.9	0.94. 1. 1.06

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
my mom and dad went on it and they did lose a lot of weight…. however my mom did have to have triple bypass… so healthy	P+	AGREEMENT	OBJECTIVE	100	NONIRONIC
I could never give up carbs - bread and pasta are my fave	P	AGREEMENT	OBJECTIVE	100	NONIRONIC
I ate the snack bars at night when I had gestational diabetes It actually helped my blood sugar levels in the AM	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC
Somebody I used to work with did it - the smell of broccoli and cauliflower with cheese for breakfast still lingers in my brain	None	AGREEMENT	OBJECTIVE	100	NONIRONIC
I went on Atkins at one time and lost 30 lbs. I'm Southern so all our family events center around good food of all kinds. Lasted about 3 months.	N	DISAGREEMENT	SUBJECTIVE	94	NONIRONIC
I lose 60 pounds in high school, I never really ate Atkins products but it works! Not long lasting though.	N+	DISAGREEMENT	OBJECTIVE	94	NONIRONIC
My mom still tells me to eat these I hate the taste Omg	N	AGREEMENT	SUBJECTIVE	100	NONIRONIC
I think it depends on the blood type, O type is meat, A vegetarian ect. Also	N	AGREEMENT	SUBJECTIVE	92	NONIRONIC

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
anything in the "industry" is for money. We can't win.					
Been eating Atkins since 1999. It works	P	AGREEMENT	OBJECTIVE	100	NONIRONIC
ATKINS % WORKS!!!! I've lost over 30 lbs more than once on Atkinsa!	NEU	DISAGREEMENT	OBJECTIVE	94	NONIRONIC

Figure 3. Example of results provided by MeaningCloud for the 50 comments collected in the #AtkinsDiet hashtag. (10 out of 50 Comments Shown)

As shown in Figure 3, MeaningCloud analyzed that 13 out of 50 comments presented with an overwhelming positive polarity, 14 out of the 50 comments presented with a positive polarity, 6 comments presented with a neutral polarity, 14 comments with a negative polarity, and 3 comments with an overwhelming negative polarity when discussing the Atkins Diet. Additionally, MeaningCloud analyzed that 27 out of 50 comments were written objectively, while 23 out of 50 comments were written subjectively. In total there was a 98.24% confidence in the accuracy of the sentiment analysis of the comments. Overall, the polarity of the comments regarding the Atkins Diet were largely positive. These comments that were deemed positive had an optimist view about the content they had just watched, expressing gratitude towards the content creator. They would also encourage and praise the growth of the creator if it was a video about their progress in trying out the diet. From an outside perspective, an individual who watched this video and scrolled through the comments, would be exposed to positive reinforcement.

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
We all tried to tell ya	P	AGREEMENT	OBJECTIVE	100	NONIRONIC
The fact that we tried for AGES TO TELL HER THIS	N	AGREEMENT	OBJECTIVE	100	NONIRONIC
I feel like keto is a temporary fix… long term isn't ideal I couldn't do it	N	AGREEMENT	OBJECTIVE	92	NONIRONIC
I just started my keto journey. Day 3 Week 4 I'm down 16 pounds. To me, this is one of the hardest things I've done	NEU	DISAGREEMENT	OBJECTIVE	94	NONIRONIC
To each their own. Everyone has to find what works for them. For me, Keto saved my life. 5 years and never going back.	P	AGREEMENT	OBJECTIVE	100	NONIRONIC
Even better lettuce wrapped	P+	AGREEMENT	SUBJECT	98	NONIRO

		NT	IVE		NIC
I keep forgetting about egg salad !!	NEU	DISAGREE MENT	SUBJECT IVE	94	NONIRO NIC
I love egg salad…I wrap it up in a large romaine leaf, same thing with chicken salad… YUM !…	P+	AGREEME NT	SUBJECT IVE	100	NONIRO NIC
egg salad is going to be crucial in my diet now	P	AGREEME NT	SUBJECT IVE	100	NONIRO NIC
I love pickles! Now I need to try it in egg salad	P+	AGREEME NT	SUBJECT IVE	100	NONIRO NIC

Figure 4. Results provided by MeaningCloud for the 50 comments collected in the #Keto hashtag. (10 out of 50 Comments Shown)

As shown in Figure 4, MeaningCloud analyzed that 14 comments presented with an overwhelming positive polarity, 13 comments with a positive polarity, 5 comments with a neutral polarity, 15 comments with a negative polarity, and 3 comments with an overwhelming negative polarity out of 50 comments when discussing the Keto Diet. Additionally, MeaningCloud analyzed that 26 out 50 comments were written objectively, while 34 out of 50 comments were written subjectively. In total, there was a 98.2% confidence in the accuracy of the sentiment analysis of the comments. Overall, the polarity of the comments regarding the Keto Diet were largely positive. Most comments consisted of a praise of recipes or the progress an individual made throughout their keto journey. These comments would also add on to the video, telling the creator other alternatives to improve upon the recipes, creating a community in these keto videos of positivity and encouragement.

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
It's just a way of eating…Mediterranean people and Middle Easterners eat this way. It's not a fad or trend. Hope everyone enjoys!	P	AGREEME NT	SUBJEC TIVE	100	NONIRO NIC
This all just sounds like a normal balanced diet	NEU	DISAGREE MENT	OBJECTI VE	94	NONIRO NIC
I didn't realize I have a Mediterranean diet until now	N	AGREEME NT	OBJECTI VE	100	NONIRO NIC
mediterranean food is so good	P	AGREEME NT	SUBJEC TIVE	100	NONIRO NIC
dairy in moderation??? nah we're literally eating yogurt as a side with everything	N	AGREEME NT	OBJECTI VE	100	NONIRO NIC
I can get over veggies but I CANNOT do fish or seafood	NEU	DISAGREE MENT	OBJECTI VE	86	NONIRO NIC

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
was recently diagnosed with MS & heard that an "anti inflammatory" diet might ease symptoms, this is very helpful & very organized video!! tysm!	P	DISAGREEMENT	OBJECTIVE	92	NONIRONIC
my favorite diet and after w lot of research also shows great benefits for hormone regulation and endometriosis	P+	AGREEMENT	SUBJECTIVE	98	NONIRONIC
What if you don't like seafood at all, like won't eat it. Suggestions? Chicken maybe?	P	AGREEMENT	SUBJECTIVE	100	NONIRONIC
Can you do a video of just cheese. Which ones are good and which aren't	P	AGREEMENT	SUBJECTIVE	100	NONIRONIC

Figure 5. Results provided by MeaningCloud of the 50 comments collected in the #MediterraneanDiet. (10 out of 50 Comments Shown)

As shown in Figure 5, MeaningCloud analyzed that 13 comments presented with an overwhelming positive polarity, 19 comments with a positive polarity, 7 comments with a neutral polarity, 10 comments with a negative polarity, and 1 comment with an overwhelming negative polarity out of the 50 comments when discussing the Mediterranean Diet. Additionally, MeaningCloud analyzed that 26 out of the 50 comments were written objectively, while 34 out of 50 comments were written subjectively. In total, there was a 98.96% confidence in the accuracy of the sentiment analysis of the comments. Overall, the polarity of the comments regarding the Mediterranean Diet were largely positive. Most of these comments consisted of expressing their love for the food of the Mediterranean diet and their willingness to attempt to try this diet in the future. There were also comments on other messages of positivity, expressing how much their families and themselves enjoyed the food when creating these recipes, setting a positive atmosphere around the Mediterranean dieting community.

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
Pea protein is the best for u. Peas are super nutritious	P+	AGREEMENT	SUBJECTIVE	100	NONIRONIC
What am even supposed to eat then fam	N	AGREEMENT	SUBJECTIVE	100	NONIRONIC
Vegetarianism has made Sikhs weak!!! Please reintroduce jhatja	N	AGREEMENT	SUBJECTIVE	100	NONIRONIC
I live off plant based food lmao	P	AGREEMENT	OBJECTIVE	100	NONIRONIC
Are you a doctor bhaji?	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC
Can you do soya milk if yes please tag me	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
Next pls tag me	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC
U made me love this	P+	AGREEMENT	SUBJECTIVE	100	NONIRONIC
Pls are you in Accra? I would like to purchase some	P	AGREEMENT	SUBJECTIVE	100	NONIRONIC
Pls what is in the pepper	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC

Figure 6. Results provided by MeaningCloud of the 50 comments collected in the #vegandiet (10 out of 50 Comments Shown)

As shown in Figure 6, MeaningCloud analyzed that 8 comments presented with an overwhelming positive polarity, 16 comments with a positive polarity, 11 comments with a neutral polarity, 14 comments with a negative polarity, and 1 comment with an overwhelming negative polarity out of the 50 comments when discussing the Vegan Diet. Additionally, MeaningCloud analyzed that 29 out of the 50 comments were written objectively, while 31 out of 50 comments were written subjectively. In total, there was a 96.86% confidence in the accuracy of the sentiment analysis of the comments. Overall, the polarity of the comments regarding the Vegan Diet were largely positive. Most of these comments consisted of praise and appreciation about the content they had viewed. Individuals would comment about the foods they just saw and mentioned about the overall healthiness of these foods. They would also mention how these foods made them crave for them and how it made them want to follow through with these diets. Users also expressed their gratitude towards the content creator and urged them to keep sharing more.

Text	Polarity	Agreement	Subjectivity	Confidence	Irony
100% true I found out I had fattie liver and started detox natural Remedies and I've lost 58lb since 7/22♥	NEU	DISAGREEMENT	OBJECTIVE	94	NONIRONIC
The livers job is to detox isnt it	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC
My trainer made me do blood work before starting anything	P	AGREEMENT	OBJECTIVE	100	NONIRONIC
Do you just drink the smoothie for 6 weeks? And have meals too?	NEU	AGREEMENT	OBJECTIVE	100	NONIRONIC
This! but also focus on your mental health! Not many talk about this, and I lost 80lbs and this was the biggest contributor, and still is!	N	AGREEMENT	OBJECTIVE	100	NONIRONIC
i think detox is just what she calls her ed ♀	N	AGREEMENT	SUBJECTIVE	100	NONIRONIC

		AGREEMENT	SUBJECTIVE	98	NONIRONIC
She looks tired. So very tired.	N+	AGREEMENT	SUBJECTIVE	98	NONIRONIC
she looks so empty and tired	N	AGREEMENT	OBJECTIVE	100	NONIRONIC
And she's just casually hooked up to a IV during this interview	N	AGREEMENT	OBJECTIVE	100	NONIRONIC
The second anyone says the word detox	N	AGREEMENT	OBJECTIVE	100	NONIRONIC

Figure 7. Results provided by MeaningCloud of the 50 comments collected in the #detoxdiet. (10 out of 50 Comments Shown)

As shown in Figure 7, MeaningCloud analyzed that 4 comments presented with an overwhelming positive polarity, 13 comments with a positive polarity, 10 comments with a neutral polarity, 20 comments with a negative polarity, and 3 comments with an overwhelming negative polarity out of the 50 comments when discussing the Vegan Diet. Additionally, MeaningCloud analyzed that 20 out of the 50 comments were written objectively, while 30 out of 50 comments were written subjectively. In total, there was a 98.52% confidence in the accuracy of the sentiment analysis of the comments. Overall, the polarity of the comments regarding the Detox Diet were largely negative. As the only diet to consist of a largely negative view, most of these comments consisted of questioning the type of content that was watched. The viewers expressed their discontent about the actual nutritional value of attempting this diet and were strongly against trying the Detox diet. They would also express how the content creator of these videos looked lifeless and tired.

Complete Sample Set
Of the 250 comments analyzed out of the five fad diets, MeaningCloud analyzed 52 comments as presenting with an overwhelming positive polarity (20.8%), 75 comments with positive polarity (30%), 39 comments with neutral polarity (15.6%), 73 comments with negative polarity (29.2%), and 11 comments with overwhelming negative polarity (4.4%). Additionally, the algorithm analyzed that 128 comments (51.2%) were written objectively, while 122 comments (48.8%) were written subjectively. From all of the comments analyzed, there was an average of 98.16% confidence in the results of the sentiment analysis.

Figure 8. The percentage of all of the polarity of the 250 comments.

ANOVA: Single Factor Statistical Test
After collecting all of the responses and implementing MeaningCloud to conduct a sentiment analysis, an ANOVA: Single Factor test was run in order to determine if there was a statistically significant difference between the values in polarity among all of the five fad diets. The p values obtained were all $< 1 \times 10^{-5}$, which made the data statistically significant at the 0.05 level. Thus, since the average variability for the different polarities between the five diets was significantly different than the average variability within the (similar categories of) different polarities, there was a statistical difference between sentiments for different fad diets (Table 6). This implied that the users perceived one fad diet to be significantly better (or worse) than another.

Table 6. The f-ratio and p-value retrieved from the ANOVA statistical test calculations.

Response category	f-ratio	p-value
P+	384.4	$< 1 \times 10^{-5}$
P	79.5	$< 1 \times 10^{-5}$
NEU	265.9	$< 1 \times 10^{-5}$
N	151.3	$< 1 \times 10^{-5}$
N+	471.7	$< 1 \times 10^{-5}$

Table 7. The Post Hoc Tukey HSD calculations for the diets, T_1, T_2, T_3, T_4 and T_5 refer to the Keto, Mediterranean, Detox, Atkins and Vegan diets respectively.

Response category	T_1T_2	T_1T_3	T_1T_4	T_1T_5	T_2T_3	T_2T_4	T_2T_5	T_3T_4	T_3T_5	T_4T_5
P+	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05
P	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05
NEU	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05

N	< .05	< .05	**0.15**	**0.15**	< .05	< .05	< .05	< .05	< .05	< .05
N-	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05

In addition to the ANOVA test, Tukey's HSD (honestly significant difference) was calculated. This procedure facilitates pairwise comparison between the diets and provided information on whether or not there was a significant difference between the sentiment for any given pair of diets. With the exception of the N response category of the Keto-Atkins and Keto-Vegan diet pairs, there was no statistical difference between any of the paired diets across any response categories (Table 7). This again implied that users sentiments (across all the categories) significantly differed among different pairs of diets.

Table 8. The ratio of Positive $[P^+ + P + (NEU/2)]$ to Negative $[N^+ + N + (NEU/2)]$ sentiment for the different diets derived from Table 4.

Diet type	Keto	Mediterranean	Detox	Atkins	Vegan
Ratio of positive to negative sentiment	1.4	1.6	0.8	1.5	1.4

The NEU sentiments were divided equally among the positive and negative sentiments.

As shown in Table 8, the positive to negative sentiment for all the diets is >1 except for the Detox diet. The Detox diet is hence associated with more negative than positive sentiment.

Discussion
From the sentiment analysis of the 250 comments collected from the five different fad diets, it was evident that there existed a disparity between the polarity of the comments. For all of the comments from all of the different fad diets, the majority of the comments contained a positive polarity, followed by a negative polarity, then a neutral polarity. This finding was reinforced by the p value obtained by the results of the ANOVA: Single Statistical Test and the Post Hoc Tukey's HSD calculations.

Depending on the popularity of the fad diet, there was a difference between the polarity of the comments. For example, the Keto Diet, the diet which was associated with the greatest number of views in the hashtag presented with less negative polarity (36%) compared to the Detox Diet (46%), a diet that had a smaller number of views compared to the Keto Diet. These results showed that the more popular (more posts and views) the diet, the more positive sentiment it generated. This was important to understand because hashtags that contained more posts presented with greater positive sentiment, meaning that there was constant reinforcement of positivity of these fad diets. Most of the comments analyzed consisted of praise and approval of the diets, showing the willingness of the viewers to attempt to try these diets. These users would also comment on the overall body of the content creator and recipes, being impressed with the results and taste. These comments created a positive sense of community towards individuals scrolling through the comments of these videos within these dieting videos (excluding the detox diet). As Zheng et al. found, positive reinforcement has a strong influence on its users, the overall positivity within these dieting communities increased the tendency of users to try these

fad diets due to constant positive reinforcement (Zheng et. et al, 2013) [14]. Furthermore, Oh et al. found that the positive sentiment of users increased the tendency of users to share content with other users (Oh et. al, 2022) [13]. In relation to the studies performed in this research, the positive sentiment of users regarding fad diet content on Tik Tok is hence anticipated to cause more interaction with this content. All of these factors would lead towards more users developing a negative body image, unhealthy eating habits and increased mental health issues, which are all detrimental health effects that can increase the chance of severe metabolic disability or death (Minadeo et. al, 2023) [5]. The prevalence of inaccurate nutritional information and the lack of understanding of the inaccurate information causes users to adopt unnatural eating patterns with no benefits that harm their overall health (Anderson, 2020) [21].

This is especially significant to consider when a majority of the users on Tik Tok are adolescents or children. Compared to adults, these younger audiences are more likely to adopt these eating patterns as they constantly surround themselves with these types of content and have a more desire to fit in with societal norms (Mordzejewska et al., 2022[4]; Law and Jevons, 2023) [22]. They feel pressured to change their body in order to fit in with the glorified body image that is encouraged on social media (Hsu, 2023) [6]. Both the mental and physical health of these users decline significantly after adopting the unhealthy and unnatural eating patterns (Tahreem et. al, 2022) [2]. Users tended to adopt diets that presented with more positive sentiments more readily than they adopted those which presented with largely negative sentiment.

In the Detox diet hashtag (largely negative polarity), users could be found questioning the actual validity of nutritional content that they were presented with. This implied that in regard to content that had a greater negative sentiment, users were more aware and skeptical and questioned the actual validity of the information provided. Example of these comments included "The second anyone says the word detox   " and Distilled water is no for drinking guys!". This is also present in the ratio of positive and negative sentiment of all the diets. For the Detox diet, it was the only diet with a ratio less than 1, having more negative than positive sentiment, while the other diets all had ratios above 1.

Considering the low ratio, the Detox diet is one of the diets with the least amount of likes and views. This is important to consider as the diets with the higher ratios all almost had more likes and views than the Detox diet. As users continue to interact with these types of content, not only is the positive reinforcement associated with these diets are increased, but the interactions make the algorithm push this content towards more individuals. With TikTok's algorithm, being built solely around pushing contents that garners a high amount of likes and views, users are more likely to be exposed to these types of content. This ultimately creates an endless cycle of engagement and positivity that pushes fad diets onto users, leading to less proper, healthy practices.

In promoting such practices, the influence of TikTok extends beyond individuals' choices, connecting towards broader public health concerns. To an increased number of eating disorders and body image issues among adolescents, to higher rates of obesity and unhealthy dietary practices, Tik Tok has a link towards broader public health concerns. Understanding and regulating proper use of TikTok is a necessity for the benefit of the future generations. As

TikTok continues to become more popularized in the world, it needs to be regarded as a top priority.

Limitations

MeaningCloud, the application utilized to analyze the sentiment of the comments may not be accurate. There was a high accuracy score throughout all the 250 comments, averaging a total of 98.16%, however, the algorithm could have been inaccurate from the incorrect analysis of polarity. When looking at the comments and the analysis provided by MeaningCloud, there were some instances when there were discrepancies. In some instances, MeaningCloud provided the incorrect polarity because it was not able to understand the context or discern certain human-like aspects like humor. Similarly to MeaningCloud, ChatGPT has similar issues. As an artificial intelligence chatbot that utilizes a natural language processing model, it could not pick up on certain human-like linguistic semantic such as irony or understand the contextual meaning of the comments. Additionally, although a random selection and an inclusion criterion was utilized for analysis, comments from users varied from all different levels of experience; ranging from inexperienced to experienced. A person inexperienced would be an individual with no prior knowledge of fad diets or someone who had never incorporated one in their life. A person experienced would be an individual who had tried the fad diet prior to watching the video. Most comments out of the 250 comments seemed to originate from more experienced than from inexperienced individuals, which could have had an effect on the polarity. This was mostly demonstrated by the prevalence of questions left by inexperienced users, which provided a more neutral polarity. Experienced users; on the other hand; would generally tend to always lean towards a positive or negative polarity due to already having incorporated some of these eating habits in their lifestyle. All of these factors overall could have skewed the results of the research process due to the fact that if all of the comments selected for a video generally consisted of inexperienced users, the polarity would be more neutral, only accounting for one side of the audience. While for the other side, if the comments consisted of only experienced users, the polarity would shift towards either a positive or negative polarity.

Assuming 42 million adolescents, the target sample size needed in order to obtain results with 95% confidence and a margin of error of 0.064 was a calculated at 250. Therefore, the study could only analyze at a margin of error of ± 6.4%. This did not pose a large enough limitation however, since the ANOVA p-values were still orders-of-magnitude below 0.05. The pair-wise diets also presented with p-values of < .05, with the exception of one response category for two diet pairs (Table 7).

Conclusion

This research found that out of 250 TikTok comments collected from 5 different fad diet hashtags, around half of the users demonstrated a positive polarity, one third of users presented with a negative polarity, and ~ 15% of users presented with a neutral polarity. These results show that the collective view of fad diet content on TikTok is generally positive. Additionally, the p-value obtained from the ANOVA Single Factor Statistical Test provided evidence that the data from the sentiment analysis was statistically significant, thereby reinforcing the polarity found among the TikTok comments. It is therefore concerning that the copious fad diet content on TikTok is perceived as positive despite there being no scientific evidence. The content hence poses detrimental health risks for impressionable adolescents. The young audience that interacts

with this content that struggle to maintain their body weight and strive for the body image that social media promotes are frequently engaging and sharing media to other users. This ends up not only harming themselves, but also other users, exacerbating the influence these fad diet videos have on TikTok.

Overall, this research is able to provide new research towards TikTok fad diet content. It provides data on the sentiment analysis of TikTok comments on fad diet videos, allowing other researchers to understand the polarity between the content and the users. As it was mostly positive, younger users on TikTok are more likely to be vulnerable to the influence of fad diet content. This positive reaction will provide more interactions among these users and needs to be addressed in order to help the health of the younger audience through the expanding usage of TikTok in the following years. Future research that could happen to address this problem is researching the credibility of content creators regarding fad diet content or fact checking recipes on TikTok in order to reduce the impacts of fad diet content on its users. Another way to expand on this research is to utilize human analysis rather than relying on AI or other text analysis tools in order to obtain more accurate results from the sentiment of users. Similarly, for future research, conducting the research with a lower margin of error is able to enhance on the research by providing clearer results and solidifying the reliability of the findings.

References

1. CDC. (2021, June 7). *Obesity is a Common, Serious, and Costly Disease*. Centers for Disease Control and Prevention. https://www.cdc.gov/obesity/data/adult.html#:~:text=Obesity%20is%20a%20common%2C%20serious%2C%20and%20costly%20disease&text=Obesity%2Drelated%20conditions%20include%20heart

2. Tahreem, A., Rakha, A., Rabail, R., Nazir, A., Socol, C. T., Maerescu, C. M., & Aadil, R. M. (2022). Fad Diets: Facts and Fiction. *Frontiers in Nutrition*, *9*(9). https://doi.org/10.3389/fnut.2022.960922

3. Teng, Y., Huang, S.-W., Li, Z., & Xie, Q.-M. (2020, April). *Seasonal variation and trends in the Internet searches for losing weight: An infodemiological study*. ResearchGate. https://www.researchgate.net/publication/340956362_Seasonal_variation_and_trends_in_the_Internet_searches_for_losing_weight_An_infodemiological_study

4. Modrzejewska, A., Czepczor-Bernat, K., Modrzejewska, J., Roszkowska, A., Zembura, M., & Matusik, P. (2022). #childhoodobesity – A brief literature review of the role of social media in body image shaping and eating patterns among children and adolescents. *Frontiers in Pediatrics*, *10*. https://doi.org/10.3389/fped.2022.993460

5. Minadeo, M., & Pope, L. (2022). Weight-normative messaging predominates on TikTok—A qualitative content analysis. *PLOS ONE*, *17*(11), e0267997. https://doi.org/10.1371/journal.pone.0267997

6. Hsu, M. S. H., Rouf, A., & Allman-Farinelli, M. (2018). Effectiveness and Behavioral Mechanisms of Social Media Interventions for Positive Nutrition Behaviors in Adolescents: A Systematic Review. *Journal of Adolescent Health*, *63*(5), 531–545. https://doi.org/10.1016/j.jadohealth.2018.06.009

7. Mills, J. S., Minister, C., & Samson, L. (2022). Enriching sociocultural perspectives on the effects of idealized body norms: Integrating shame, positive body image, and self-compassion. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.983534

8. Khawandanah, J., & Tewfik, I. (2016). Fad Diets: Lifestyle Promises and Health Challenges. *Journal of Food Research*, *5*(6), 80. https://doi.org/10.5539/jfr.v5n6p80

9. Kurnialandi, A., Gamelia, E., & Masfiah, S. (2023). The Effect of Tiktok Usage Behavior on Body Image in Jenderal Soedirman University Students. *JURNAL IPTEKKOM (Jurnal Ilmu*

10. *Eating Disorders Coalition: Facts About Eating Disorders*. (n.d.). Eatingdisorderscoalition.org. https://eatingdisorderscoalition.org/inner_template/facts_and_info/facts-about-eating-disorders.html

11. TikTok. (2023, March 21). *Celebrating our thriving community of 150 million Americans*. Newsroom | TikTok. https://newsroom.tiktok.com/en-us/150-m-us-users

12. Vogels, E. A., Gelles-Watnick, R., & Massarat, N. (2022, August 10). *Teens, Social Media and Technology 2022*. Pew Research Center. https://www.pewresearch.org/internet/2022/08/10/teens-social-media-and-technology-2022/

13. Oh, H., Goh, K.-Y., & Phan, T. Q. (2022). Are You What You Tweet? The Impact of Sentiment on Digital News Consumption and Social Media Sharing. *Information Systems Research*, *34*(1). https://doi.org/10.1287/isre.2022.1112

14. Zheng, M., Lü, L., & Zhao, M. (2013). Spreading in online social networks: The role of social reinforcement. *Physical Review E*, *88*(1). https://doi.org/10.1103/physreve.88.012818

15. Norhalila, C., & Khadijah, S. J. (2016, August). Weight Loss with Atkins Diet. https://www.eares.org/siteadmin/upload/EAP816231.pdf

16. Cohen, E., Siri-Tarino, P. W., Tahara, N., Otvos, J. D., Toth, P. P., Manickam, P., Krauss, R. M., Hall, K. D., Retterstøl, K., Mora, S., Lorgeril, M. de, Babio, N., Estruch, R., … Hulthe, J. (2019, November 28). *The ketogenic diet: Pros and cons*. Atherosclerosis. https://www.sciencedirect.com/science/article/pii/S0021915019315898

17. Davis, C., Bryan, J., Hodgson, J., & Murphy, K. (2015, November 5). *Definition of the Mediterranean diet; a literature review*. MDPI. https://www.mdpi.com/2072-6643/7/11/9139

18. Health implications of a vegetarian diet: A review - kate marsh, Carol Zeuschner, Angela Saunders, 2012. (n.d.-b). https://journals.sagepub.com/doi/abs/10.1177/1559827611425762

19. H;, K. A. (n.d.). *Detox diets for toxin elimination and weight management: A Critical Review of the evidence*. Journal of human nutrition and dietetics : the official journal of the British Dietetic Association. https://pubmed.ncbi.nlm.nih.gov/25522674/

20. *MeaningCloud*. (2015). MeaningCloud. https://www.meaningcloud.com/

21. Courtney, A. (2020, March 6). *Self-perceived nutrition knowledge vs. actual nutrition knowledge and willingness to participate in fad diets*. Tdl.org. https://baylor-ir.tdl.org/items/efd9bbd4-7ccd-4b97-9500-ed3e45b0ca3e

22. Law, R. M., & Jevons, E. (2023). Exploring the perceived influence of social media use on disordered eating in nutrition and dietetics students. *Journal of Human Nutrition and Dietetics*, *36*(5). https://onlinelibrary.wiley.com/doi/10.1111/jhn.13212

Thank you for addressing my comments. I made some changes to the conclusion section to clean up language and include content.
Accepted.