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COLLEGE STUDENTS FAIL TO IDENTIFY NUTRITION MISINFORMATION ON
SOCIAL MEDIA

By
Helen Mary Katool

A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of
the requirements of the Sally McDonnell Barksdale Honors College.

Oxford

May 2022

Approved by

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ABSTRACT

HELEN MARY KATOOL: College Students Fail to Identify Nutrition Misinformation on Social Media

(Under the direction of Dr. Melinda Valliant)

Social media has become a part of everyday life in our society and has the capability to reach billions, across age groups. Research has shown that there is a direct link between the widespread access to social media and the amount of misinformation that is circulating. In fact, unqualified and uneducated individuals share believable but inaccurate nutrition posts. Therefore, the purpose of this study is to determine if college students can distinguish the difference between nutrition misinformation or factual nutrition information when presented on social media. Male and female college students (≥ 18 years old) from two classes (nutrition and biology) were presented with a series of posts from either Instagram or Tik Tok. Sixteen were nutrition misinformation posts and four evidenced based posts, by Registered Dietitians (RD). Participants were tasked to rank the accuracy of each post on a Likert scale from 1 to 5.

A total of 210 college students (42 nutrition) completed the study. There was significant mean difference between males and females (58.5 ± 7.0 and 55.8 ± 7.8 , $p=0.002$), respectively, with females misidentifying the posts as factual more frequently.

Additionally, there was a significant mean difference between the biology and nutrition class (57.6 ± 7.1 and 51.3 ± 8.0 , $p=0.000$), respectively, with biology students misidentifying the posts as factual more frequently. More participants answered

incorrectly (41.4%) than participants who answered correctly (35.3%), while 23% were neutral. These findings illustrate how easily social media can spread nutrition misinformation and how important it is to educate students on the prevalence of misinformation on the internet.

INTRODUCTION

Information on social media has the potential to reach billions of people across the globe in a short amount of time. One key component of this information sharing is that anyone can create and/or share any kind of information they want to, whether or not it is true. The spreading of misinformation can become a dangerous game, especially in regards to sharing misinformation about health, specifically nutrition. In today's culture the pressure to look a certain way to fit in can manifest itself in our eating habits and attitudes, especially on a college campus. Social media can play a huge role in shaping our eating habits, attitudes and nutrition knowledge. For college students, social media is a prominent part of their lives. This is where they access a lot of their information and could possibly be getting misinformation about nutrition from social media. The dangers of nutrition misinformation from social media can range anywhere from physical, economical to psychological harm. Understanding how easy it is for nutrition misinformation to be spread around social media can help professionals learn how to stop spreading misinformation.

The purpose of this study is to examine if college students believe nutrition misinformation and how they perceive that information on social media. It is hypothesized that the majority of students will believe nutrition misinformation if it is presented on social media. This study also aims to understand how students perceive evidenced based information about nutrition when presented alongside nutrition

misinformation. At the conclusion of this study, the majority of participants either believed nutrition misinformation or were unsure. This study allows researchers to better understand how college students receive nutrition information and how this can affect their nutrition knowledge.

REVIEW OF LITERATURE

What is Social Media?

In order to fully understand how nutrition advice via social media is perceived, it is important to understand what social media is, why people use it and the effects it has on its users. Most researchers agree that social media can be defined as various platforms created by anyone for anyone that allows for the sharing of content, creation and communication. It allows for interactions and networking across many different levels making this a core component of social media (Kapoor et al. 2017). Users are able to communicate about an array of topics with millions of people from around the world (Baccarell et. al, 2018). Kapoor et al. concluded that social media has redefined communication and collaboration by increasing a space for virtual knowledge and a self-help community. They found that communal identity drives engagement which leads to user satisfaction (Kapoor et al. 2017).

The material created by users of social media has been called user generated content (UGC). According to Kaplan et al. (2010), there are three requirements to be considered UGC. Firstly, it has to be published on a publicly accessible platform. Secondly, it has to have a creative effort behind it. Lastly, it must be created outside of professional routines or practices (Kaplan et al. 2010). Because social media has become a place where most individuals access their information, professionals have created a presence on social media to share information in their scope of practice for professional

reasons. However, many users create and share informative posts that are not in their area of expertise or scope of practice and this material can be defined as user generated content. Therefore, Kaplan et al. concluded that social media can be defined as “a group of internet-based applications that build on the ideological and technological foundations of web 2.0 and allow the creation and exchange of user generated content” (Kaplan et al. 2010).

Because social media allows for the exchange of user generated content over a wide range of platforms that can reach millions of users, the rise of “influencers” has followed. The term “influencers” has just recently been coined to describe a social media user that shares their ideas, beliefs and recommendations with a large number of followers. Influencers are able to influence their followers because people perceive individuals who are relatable on social media as trustworthy sources of information (Barklamb et al. 2020). Influencers are an important component of social media to understand because the more social presence one has, the larger the social influence that person has on people’s behavior (Kaplan et al. 2010). Influencers are key sharers of nutrition misinformation on social media because they can easily spread nutrition misinformation especially if they do not have proper nutrition education.

Social media consists of different platforms people can share and create content through. Popular platforms include Facebook, Twitter, Instagram, Tik Tok, Snap Chat, YouTube and Pinterest. These platforms allow users to share pictures, graphics, videos, stories, captions and comments. For example, on Instagram an individual can share a picture(s) or a video(s) to their feed which is permanently published on their account or they can share a picture(s) or video(s) to their story which is temporarily published for 24

hours. These pictures or videos can contain words and captions. Other individuals can also add comments to permanent posts on user's accounts. This illustrates how information can be shared and exchanged on a social media platform. Most platforms allow for users to share pictures, videos, stories, comments and captions however each platform has a main reason for sharing. For example, Pinterest and Instagram are predominantly picture sharing platforms while Tik Tok and YouTube are predominantly video sharing platforms. Twitter predominantly allows for the exchange of comments, phrases and quick stories. Facebook predominantly shares stories, comments and pictures. Altogether these platforms were created for the exchange and sharing of information. It is important to understand what kinds of platforms people are sharing information on to understand how and why people use social media, especially in regards to nutrition information.

Individuals use social media for various reasons and make accounts for reasons ranging from personal to business. People make personal accounts on social media because they want to gain rewards by making good impressions and want to create an image that fits their identity. Ultimately, they want a presence in cyberspace (Kaplan et al. 2010). Social media gives its users a space where they can feel a sense of belonging and access social support while creating attachment to others (Barklamb et al. 2020). Individuals are able to keep up with long or short distance friends and family, news and daily updates, latest fashion trends, reviews and recommendations among many other reasons. Additionally, using social media allows for people to find solutions to problems they might experience in their everyday lives (Idemudia et al. 2016).

Along with social media being of use in people's everyday lives, it also has a place in businesses. Because social media users rely on other users to tell them their experiences with certain things before purchasing a product, businesses can use social media as a major part of their marketing scheme (Kapoor et al. 2017, Dunlop et al. 2016). Businesses might use social media in order to improve their marketing, public relations, customer service, product development and personnel decision-making skills (Baccarella et al. 2018). Kapoor et al. came to the conclusion that social media can be used for socialization, congregation, aggregation and information sharing and exchange (Kapoor et al. 2017). This illustrates how the content on social media can have a major impact on its users lives. People are looking for answers to their problems or everyday questions on social media, making it a powerful tool for information sharing and for the marketing department of businesses.

Social media is a prominent part of many people's lives both worldwide and in the United States. Social media use has grown in the past decade with only 5% of Americans using social media in 2005 to 72% of Americans using social media in 2021 (Pew. 2022). Furthermore, 84% of young adults ages 18-29 report using social media (Perrin & Anderson. 2021). Worldwide, 4.55 billion people or 57.6% of the total population are using social media (Kemp. 2021). Several factors influence the number of users for each platform which include age, gender and educational attainment (Pew. 2022). Specifically, 40% of all American adults use Instagram, 69% use Facebook, 81% use YouTube and 21% use Tik Tok (Pew. 2022). Instagram, Tik Tok and YouTube are more popular among young adults ages 18-29 than these platforms are for other age

groups. For example, 71% of young adults ages 18-29 use Instagram, 70% use Facebook, 48% use Tik Tok and 95% use YouTube (Pew. 2022).

Not only do most adults use social media, they also spend a considerable amount of time on social media. In 2021, Adults in the US spend an average of 2 hours and 8 minutes a day on social media (Social. 2021). Additionally, most social media users visit social media apps several times a day. For example, 59% of all American adults report visiting Instagram daily and 38% report visiting the app several times a day (Perrin & Anderson. 2021). However, young adults spend more time on social media than other age groups. For instance, 76% of Instagram users ages 18-29 use the app daily while 60% of this age group use the app several times a day (Perrin & Anderson. 2021). The statistics on social media usage illustrate how the information they are gathering on these platforms can heavily influence their thoughts and behaviors.

College Students and Nutrition Knowledge

Knowledge is power and in regards to nutrition there is no exception to this theory. Having accurate and adequate nutrition information is essential to making decisions about one's eating behaviors. Examining the nutrition knowledge of college students is key to understanding how they make decisions related to their eating habits. Research has shown that most college students have inadequate levels of nutrition knowledge (Medina et. al, 2020, Husain et. al, 2021 Barzegari et. al, 2011). When comparing the nutrition knowledge level of males and females, researchers can agree that females have higher nutrition knowledge levels than males (Husain et. al, 2021, Yahia et. al, 2016). Husain et. al, 2021 provides a possible explanation for this by concluding

through their research that females were more likely to access their nutrition information from reliable sources such as registered dietitians than males (Husain et. al, 2021).

Furthermore, students have acknowledged that there is a lack of nutrition information accessible to them on their campus leading to their lack in nutrition knowledge (Barzegari et. al, 2011).

While there is a lack of nutrition knowledge there might also be a lack of accurate and quality nutrition information. For instance, Sogari et. al (2018) reported that students thought eating healthy is eating clean and eating clean is eating only vegetables, fruit and protein. While eating vegetables, fruit and protein is all part of a healthy diet, healthy fats, carbs and fiber should also be included in a healthy diet. Furthermore, having the mindset of all or nothing in regards to eating habits, such as clean eating, can lead to disordered eating attitudes and behaviors. Another misconception that students report believing is that in order to eat healthy one must eat less and have smaller portions. However, these students now realize this is not the case and believe eating healthy means eating healthy foods (Sogari et. al (2018)). These same students report that their motivation to eat healthy is a result of social pressure, seeing others with their ideal body or clothing and seeing celebrities (Sogari et. al (2018)).

Studies have also explored the nutritional knowledge of specific food groups in participants. One study examined how people perceive sugar as part of their diet. This Study found that participants view sugar in fruit as “good” and processed sugar as “bad” while also associating weight gain and health problems with an increase in sugar intake (Prada et. al, 2021). Researchers concluded that people categorize sugar as either good or bad instead of looking at sugar as either added or intrinsic (Prada et. al, 2021). This study

illustrates how individuals can categorize products with specific food groups as good or bad and only look at their diet in black and white, not realizing that there is more of a gray area. To further prove this point, another study looked at how its participants perceive the macronutrient, fat. Landry et. al (2020) concluded that students perceive no-fat options as more healthy than meals with unsaturated fats, illustrating the misconceptions students have about fat free meals vs meals with unsaturated fats (Landry et. al, 2020). Students do not understand the importance of the role of fat in the diet and believe anything containing fat, whether unsaturated fat or saturated fat, is “bad.” This again illustrates that students do not have adequate knowledge about nutrition and how different foods play a role in a well-balanced diet. The lack of accurate nutrition knowledge can make students more susceptible to nutrition misinformation on social media.

Nutrition information and social media

Where are college students accessing their nutrition information

The source of college student’s nutrition information directly affects their nutrition knowledge. Research has shown that college students and young adults mainly access their nutrition advice and information from social media and the internet (Adamski et. al, 2020, Pilgrim et. al, 2019, Bissonnette-Maheux et. al, 2015, Moorman et. al, 2020, Bourke et. al, 2019, Quaidoo et. al, 2018, Wartella et. al, 2016, Carrotte et. al, 2015). Whether it is to directly look up a piece of information, confirm a piece of information from a friend or family member or passively take in nutrition information, a young adult’s first outlet is the internet and social media (Quaidoo et. al, 2018). Studies have

concluded that social media platforms such as Pinterest and Instagram are college student's most trusted source of dietary information (Jackson et. al, 2019). Additionally, research has illustrated that individuals use Facebook, Instagram and Twitter to access diet, fitness and detox information (Carrotte et. al, 2015). While social media and the internet have not always been the first choice for young adults, the growth in technology has directly affected the ease of accessing health information (Adamski et. al, 2020). Over the past couple of decades, the use of social media for nutrition information has exponentially increased and has become the second most accessed area on social media (Adamski et. al, 2020, Ramachandran et. al, 2018, Pollard et. al, 2015).

Along with the ease of access of technology, motivations to look for nutrition information has affected the amount of individuals who use social media for nutrition information. Individuals are searching for personal connectedness, information richness and well-presented information when they are looking for nutrition information (Bourke et. al, 2019). Social media contains all three, which is why it is a popular source to choose (Bourke et. al, 2019). Social media offers its users personal connectedness when its users share personal experiences and create support networks for various topics. Personal connectedness can add to motivations for using social media for nutrition advice because people "value the personal experiences provided by 'real people' and describe nutrition information from social media as more relevant to and personalized than general nutrition advice" (Bourke et. al, 2019). People are able to access a wide variety of new and trending topics from several people on social media, making it a source of information richness. Because it is a place where people can collect different perspectives and an abundance of information, information richness adds to people's motivations to

choose social media to access nutrition information (Bourke et. al, 2019). Beauty, physical health, social acceptance, gaining self-confidence and family and peer pressure can all contribute to people's motivations for gaining nutrition information (Jalali et. al, 2020). Researchers reported that individuals agree media is “best for receiving various pieces of training and updating their information on different aspects of health issues including weight loss diets and appropriate exercises for gaining fitness” (Jalali et. al, 2020).

Another attractive quality surrounding social media is that it is affordable. People note that accessing nutrition information on social media is the most affordable route all while being able to access a variety of information and staying up to date with new information (Jalali et. al, 2020). Because most people access their nutrition information on social media, social media has an effect on these individuals’ behaviors. Research has demonstrated that people will change their behavior based on the nutrition claims and advice they see on social media (Riesmeyer et. al, 2019, Ettl el. al, 2012, Jackson et. al, 2019), making social media a powerful tool for nutrition information exchange. Because of the power that social media can have, it is essential for public health officials and clinicians to be aware of misinformation on social media and learn how the general public views that misinformation in order to fully understand what kind of effects social media has on people.

How reliable is the nutrition information on the internet?

Because college students and young adults mainly access their nutrition advice and information from the internet and social media, it is important to examine how

accurate nutrition information is on these platforms. Recent studies found that nutrition information on social media and the internet is not always accurate and reliable information. One possible explanation for this is that there are no filters or quality and accuracy control on information put on social media which can lead to the growth of myths and pseudoscience on the internet (Adamski et. al, 2020). Additionally, anyone can provide nutrition information online without any limits (Adamski et. al, 2020). This is an example of user generated content meaning that information is created by the general public instead of a professional (Adamski et. al, 2020). Research has shown that most of the health information on the internet is user generated content (Adamski et. al, 2020). Furthermore, studies have proven that nutrition information online directly contradicts nutrition guidelines set forth for the public (Ramachandran et. al, 2018). Online nutrition information is advising the public to limit fruit, cut out food groups, consume saturated fats, overly restrict themselves and implement fad diets (Ramachandran et. al, 2018). Specific diets such as dairy free and gluten free diets are being promoted to those who do not have a medical need to be on these diets (Ramachandran et. al, 2018, Arslain et. al, 2021). Additionally, pro eating disorder information about weight loss, tricks to stop hunger cravings and laxative uses is being spread around social media (Suarez-Lledo et. al, 2021).

With as much misinformation as there is online, researchers have found that misinformation is spread more easily than evidence-based information on social media (Suarez-Lledo et. al, 2021, Pennycook et. al, 2020). This could be in part due to individuals who lack nutrition education and qualifications posting nutrition information on social media. Studies have concluded that individuals are accessing their nutrition

information from users who lack nutrition qualifications, such as celebrities or influencers (Adamski et. al, 2020, Pilgrim & Bohnet-Joschko, 2019, Ramachandran et. al, 2018, Bourke et. al, 2019, Riesmeyer et. al, 2019). When individuals access their nutrition information from influencers, they are more than likely not receiving evidenced based information (Bourke et. al, 2019). Research has examined what quality of information influencers are giving their readers and found that most do not use evidenced based references or even cite their information (Sabbagh et. al, 2020, Simunaniemi et. al, 2011). Furthermore, these influencers do not tell their readers/followers if the information they are providing is based on fact or opinion (Sabbagh et. al, 2020). Examples non-evidence-based nutrition recommendations that influencers are promoting include the zero calorie diet, ABC diet, diets regarding fruits and vegetables that are not evidenced based, skipping meals, inadequate calorie consumption, drinks to replace meals and gum chewing to stop food cravings (Gies et. al, 2014, Simunaniemi et. al, 2011).

Influencers are able to promote these diets and many more because adults perceive influencers as “friends”, thereby increasing their trust towards those influencers. Because of this, when the followers ask the influencers for their advice and recommendations, the followers will take it seriously (Pilgrim & Bohnet-Joschko, 2019). Influencers are able to get away with being seen as “experts” when in reality they are not (Adamski et. al, 2020). Because the general public does not know any difference, most people will believe all that influencers tell them. Studies have shown that people believe online nutrition information to be very reliable (Quaidoo et. al, 2018). For example, one study found that participants believed a gluten free diet is healthier than a diet with gluten

(Arslain et. al, 2021). This is a prime example of people believing something that they hear on the internet because so many people promote it and talk about it.

The Truth Effect

The truth effect theory may explain why people are prone to believing any given information on social media. This theory states that the more times someone reads a statement, the more likely they are to perceive it to be true. There are several factors that have been found to contribute to the truth effect. Firstly, processing fluency can affect someone believing information as true. When a statement is easy to understand or in other words has high processing fluency, it becomes easier for someone to believe that statement to be true (Unkelbach, 2007) Secondly, individuals with a high need for affect (NFA) are more susceptible to the truth effect (Sundar et. al, 2015). An individual with a high NFA will use emotional information to make opinions, form attitudes and change their behavior (Haddock et. al, 2008) These individuals will also be persuaded more easily by an affect-based persuasive message (Haddock et. al, 2008). In other words, if the message elicits the feelings or emotions of a person with a high NFA, that person will more than likely believe the message to be true. Sundar et. al (2015) also found that when people are primed to trust their feelings before hearing a certain statement or bit of information, those people are more susceptible to the truth effect (Sundar et. al, 2015). Lastly, source reliability will influence the truth effect. One study illustrated that if people do not remember the source from where they heard information, they are more likely to believe it is true whether or not it is a reliable or unreliable source (Henkel & Mattson, 2011). Henkel & Mattson (2011) concluded that “as source information is

rapidly lost in the transition to semantic memory, so is our ability to discriminate facts from falsehood.” The truth effect and factors associated with this theory could likely be contributing to the spread of nutrition misinformation on social media.

Effects of poor nutrition advice

The effects of nutrition misinformation on social media could be detrimental to someone’s overall health. Consequences of misinformation can range anywhere from physical harm to psychological harm. According to the Academy of Nutrition and Dietetics, misinformation can result in harmful drug and nutrient interactions, physical harm from toxic food components, delay in receiving necessary medical attention and unsafe nutrition advice (Wansink & American, 2006). Another significant area of concern is economic harm. With the health and wellness industry at a \$4.4 trillion value, there is plenty of room for products, diets, and recommendations to fail or not work as promoted costing people wasted money (Wansink & American, 2006, <https://globalwellnessinstitute.org/industry-research/the-global-wellness-economy-looking-beyond-covid/>).

Lastly, psychological harm is of significant concern as a detrimental effect of misinformation. Psychological consequences of nutrition misinformation can include eating disorders and disordered eating patterns, behaviors and attitudes. Several studies have shown there to be an association between the use of social media with eating disorders, restrictive diets, and disordered eating behaviors (Suarez-Lledo & Alvarez-Galvez, 2021, Allen et. al, 2018, Sidani et. al, 2016). Some studies have specifically

looked at the use of clean eating sites and health related pages and found that followers of these pages are more likely to have psychological consequences listed above.

Additionally, researchers agree that it is more than likely due to the suboptimal quality of nutrition information being promoted by these pages (Moorman et. al, 2020, Allen et. al, 2018, Carrotte et. al, 2015). Misinformation being promoted has been reported to make followers feel guilty about what they are eating, leading them to negatively change their eating habits through restrictive diets and adopting nutrition trends (Riesmeyer et. al, 2019). Individuals who follow influencers promoting nutrition misinformation on Instagram report that they feel as if they can only achieve happiness and their targeted ideal body through dieting, leading to disordered eating attitudes (Riesmeyer et. al, 2019). Reasons for these reactions could be attributed to the disordered messages about nutrition published on these pages. Guilt related to food consumption, the promotion of restrictive eating and disordered messages about nutrition are all content that is being published on nutrition pages and sites (Boepple & Thompson, 2016, Boepple & Thompson, 2014). Additionally, pro-eating disorder information is spread throughout social media and the internet (Suarez-Lledo & Alvarez-Galvez, 2021). Researchers have found that behaviors including weight loss tips, tips and tricks to stop hunger cravings and the misuse of laxatives and diet pills are encouraged on social media (Suarez-Lledo & Alvarez-Galvez, 2021). The promotion of this information is concerning considering that researchers have found health and wellness influencers to also have eating disorders or disordered eating attitudes (Gies et. al, 2014, Boepple & Thompson, 2014, Holland & Tiggemann, 2017).

METHODS

Presentation Development

The presentation was developed with the intention of having mainly misinformation posts with several evidence-based posts dispersed throughout the presentation. Misinformation posts were chosen by searching through social media platforms: Instagram and Tik Tok. These two platforms were chosen because they are two of the most commonly used platforms by young adults (Pew. 2022). Posts were chosen based on the topic, appeal and aesthetic of the post. Topics were chosen based on current and popular fad diets and trends. Evidence based posts were chosen from registered dietitian's sm posts.

Participants

The sample population for this study included 210 undergraduate students ages 18-21 at the University of Mississippi. Participants were recruited from two courses: an entry level professional development course in the nutrition and hospitality department and a basic biology course taken by non-science majors. These two classes were targeted because the students were less likely to have taken a basic nutrition class and the instructors were willing to schedule time for the research. The presentation slideshow was administered during an in-person class period to all students present on that day. Although all students were required to view the presentation, students were not required

to participate in the study. If students did not wish to participate, they simply didn't have to fill out an answer sheet.

Procedure

Approval from the Institutional Review Board at the University of Mississippi was obtained for this survey before administering to participants. The study was considered exempt 22x-036. Before the presentation began, paper copies of the answer sheet were distributed to any students who wished to participate. Participants were told “look at the screen and mark how true you believe each given post on the slide to be. The number on each slide corresponds to the number on the sheet given to you.” During the presentation, each slide was shown long enough for participants to read the screen and make a decision. After completion of the presentation, surveys were collected and the researcher went back through each post to clarify which posts were accurate and which ones were false. This was done to ensure participants did not receive misinformation as part of participation in this investigation.

Data Analysis

After the data were collected, participants who skipped questions or did not fully complete the survey were deleted. Additionally, for all questions related to evidenced based information, answer 1 was switched to 5, answer 2 was switched to 4 and 3 was kept the same. This was done so that the data for both the evidence-based post and misinformation posts reflected the same conclusion. For example, for evidence base posts answer 1 would have been incorrect and 5 would be correct. This is the opposite for misinformation posts, which is why these answers were flipped for the evidence-based

posts. This allows for the data analysis to be consistent. The data was entered into Google sheets. Because the surveys were completed by hand, all data entry was checked by a third party to ensure accuracy. For each question, the number of participants who answered four and five were added together to equate to the number of participants who answered correctly for a question. The number of participants who answered one and two were added together to equate to the number of participants who answered false for a question. Percentages were then taken to find how many participants answered true, false or were unsure for each question (see table 1). The data was then exported into excel to be transported into Statistical Package for Social Sciences (SPSS). Once in SPSS, descriptive statistics tests were performed to find the mean for each question and the mean for each question between the two courses and between females and males. T-tests were performed in SPSS to compare means of each individual question between biology and nutrition classes. Additionally, each participant's answer for each question was summed up to perform a T-tests in SPSS to compare the overall mean scores between nutrition and biology classes as well as females and males.

RESULTS

There was a total of 210 respondents. The majority of students were females (n= 133, 63.3%) with 77 male participants (n= 77, 36.7%). There were 42 (20%) participants from the introduction to nutrition professions (nutrition) course at The University of Mississippi and 168 (80%) participants from the inquiry into life: human biology (biology) course at The University of Mississippi.

A descriptive test was conducted by looking at the percentage of participants who answered incorrectly (answers 4 and 5), were neutral (answer 3) and answered correctly (answers 1 and 2). Half (50.95%) of all participants were incorrect in believing that Bulletproof coffee will improve fat loss, increase concentration, lower stress levels and increase energy while 20% of participants did not know how to answer. Most (71.43%) of participants were incorrect in believing that roots and fruits should be limited to heal the gut and going organic is better. Half (49.52%) of participants were incorrect in believing that organic and raw foods are better than non-organic while 33.81% did not know how to answer. Almost half (44.76%) of participants were incorrect in believing detox water will lead to a flat stomach while 18.57% did not know how to answer. About 34.29% of participants were incorrect in believing green juice should be consumed on an empty stomach to improve digestion while 28.1% were unsure. Most (60%) of participants were incorrect in believing that all sugar should be eliminated to regulate blood sugar levels, reduce inflammation, balance hormones, support brain health, mental health and gut health. Around 37.62% of participants believed the rules of the fad diet:

intermittent fasting while 28.10% were unsure. Most (86.19%) of participants believed all fats to be healthy, illustrating they were not able to identify the difference between unsaturated fats and saturated fats. About 39.05% of participants were incorrect in believing that water increases acidity in the body which can lead to diseases and negative health outcomes while 23.33% were unsure how to answer. Most (68.1%) of participants were able to correctly identify the inaccuracy of using exogenous ketones. Almost half (42.86%) of participants were incorrect in believing there is a set list of foods that cause everyone bloating and a set list of foods that cause everyone to ‘de-bloat" while 35.71% were unsure.

There were three questions regarding food combining. Most (72.86%) of participants were able to correctly identify food combining rules as misinformation. However, when the rules of food combining were presented in a different format, 42.86% of participants were incorrect in believing the rules of food combining while 31.43% were unsure. Nevertheless, in the third post regarding food combining 60% of participants were able to correctly identify food combining rules as misinformation.

There were two questions regarding the use of “detox” drinks for a flat stomach and weight loss. Almost half (44.76%) of participants were incorrect in believing detox water will result in a flat stomach while 18.57% were unsure. In the second post regarding detox drinks for weight loss, more participants (40.48%) were able to correctly identify it as misinformation.

There were four questions with accurate information from registered dietitians. For each question, the majority of participants were able to correctly identify these posts as accurate.

Independent sample t-tests indicated significant differences between the nutrition course and biology course and between males and females. The overall mean score for nutrition students was 51.57, while the overall mean score for biology students was 57.57 ($p=.000$, $df= 208$). The overall mean score for males was 58.47, and the overall mean score for females was 55.08 ($p=.002$, $df=208$). For both questions regarding detox drinks, the nutrition students (mean scores 2.31 and 2.36) identified the misinformation significantly better than the biology students (mean scores 3.24 and 2.84) ($p= .000$, $df=208$, $p=.017$, $df=208$). Similarly, the mean scores between nutrition (2.38) and biology (3.07) regarding drinking green juice on an empty stomach indicated that nutrition students identified misinformation significantly better than the biology students ($p=.001$, $df=208$). Additionally, the nutrition students (mean scores 1.55 and 1.64) identified the misinformation significantly better than the biology students (mean scores 2.16 and 2.51) for questions regarding 2 of the 3 food combining questions ($p=.001$, $df=208$, $p=.000$, $df=208$). One of the four questions from a registered dietitian measuring if students believe carbs are essential had a significant difference in mean scores with nutrition students (1.36) having a higher mean score than the biology students (1.74) ($p=.20$, $df=208$). Similarly, the nutrition (2.57) students significantly answered better than the biology (3.14) students on the question relating to intermittent fasting ($p=.006$, d

Table 1: Frequency of participants by question

Overall (n= 210)			
		f	%
Bullet Coffee	Answered incorrectly	107	50.95%
	Were neutral	42	20.00%
	Answered correctly	61	29.05%
Limit fruits/roots and go organic	Answered incorrectly	150	71.43%
	Were neutral	24	11.43%
	Answered correctly	36	17.14%
Organic and raw is better	Answered incorrectly	104	49.52%
	Were neutral	71	33.81%
	Answered correctly	35	16.67%
Detox water	Answered incorrectly	94	44.76%
	Were neutral	39	18.57%
	Answered correctly	77	36.67%
Variety of foods for Gut	Answered incorrectly	24	11.43%
	Were neutral	40	19.05%
	Answered correctly	145	69.05%
Drink juice on empty stomach	Answered incorrectly	72	34.29%
	Were neutral	59	28.10%
	Answered correctly	79	37.62%

Table 1 (Continued)

Quit Sugar	Answered incorrectly	126	60.00%
	Were neutral	28	13.33%
	Answered correctly	55	26.19%
Food combining	Answered incorrectly	29	13.81%
	Were neutral	29	13.81%
	Answered correctly	153	72.86%
Snacks	Answered incorrectly	40	19.05%
	were neutral	40	19.05%
	Answered correctly	129	61.43%
Intermittent fasting	Answered incorrectly	79	37.62%
	were neutral	59	28.10%
	Answered correctly	72	34.29%
Are all fats healthy?	Answered incorrectly	181	86.19%
	were neutral	20	9.52%
	Answered correctly	9	4.29%
Are carbs good or bad?	Answered incorrectly	14	6.67%
	were neutral	20	9.52%
	Answered correctly	177	84.29%

Table 1 (Continued):

Bloating	Answered incorrectly	90	42.86%
	were neutral	75	35.71%
	Answered correctly	57	27.14%
Can water increase acidity in body	Answered incorrectly	82	39.05%
	were neutral	49	23.33%
	Answered correctly	79	37.62%
Food combining	Answered incorrectly	90	42.86%
	were neutral	66	31.43%
	Answered correctly	53	25.24%
Exogenous ketones	Answered incorrectly	19	9.05%
	were neutral	48	22.86%
	Answered correctly	143	68.10%
Food combining	Answered incorrectly	55	26.19%
	were neutral	29	13.81%
	Answered correctly	126	60.00%
Adele diet	Answered incorrectly	48	22.86%
	were neutral	74	35.24%
	Answered correctly	88	41.90%

Table 1 (Continued):

Detox water			
	Answered incorrectly	64	30.48%
	were neutral	61	29.05%
	Answered correctly	85	40.48%
Should you eat egg yolks?			
	Answered incorrectly	15	7.14%
	were neutral	32	15.24%
	Answered correctly	163	77.62%

DISCUSSION

College students believed misinformation posts regarding the topics of bulletproof coffee, organic is better than raw, fruit and roots should be limited for gut healing, drinking green juice on an empty stomach, quitting sugar, intermittent fasting, all fats are healthy, acidic water and bloating. For these questions, over half of participants were either incorrect or unsure of how to answer. This illustrates several things. Firstly, this illustrates college students' lack of nutrition knowledge. By not being able to correctly identify information as false is indicative of their knowledge level on the subject. As indicated by current research, students do not have adequate nutrition knowledge regarding sugar. In the literature review, students categorized sugar as either good or bad and associated negative health problems and weight gain with an increase in sugar (Prada et. al, 2021). Likewise, the question regarding sugar presented in this study has similar results. The majority of participants (60%) believed that sugar should be completely eliminated to regulate blood sugar levels, reduce inflammation, balance hormones, support brain health, mental health and gut health. Furthermore, congruent with current research on students' perception of the nutrient fat, this study illustrates students' lack of nutrition knowledge regarding the difference between saturated and unsaturated fats. The majority of participants (86.19%) incorrectly identified ghee and coconut oil, which are mainly saturated fats, as a healthy fat when they were grouped with olive oil and avocados, which contain mostly unsaturated fats. These findings indicate students'

inability to distinguish between saturated fat sources and unsaturated fat sources as well as the health difference between the two.

Secondly, this illustrates that college students will take any given information from social media as true without taking into consideration the source of information. Participants did not know if the source was someone who was qualified to give information or if the information was backed up by research, based on what was presented for each post. This could have several meanings. Students might not realize the importance of evidence-based information or the importance of who is giving nutrition information. Furthermore, students might not know the difference between a registered dietitian and a nutritionist.

Lastly, the results indicate that students consider social media as a reliable source of nutrition information. Congruent with current research presented in the literature review, students believe that using social media as a source of information is reliable. The current generation of college students grew up with social media and the technology era. These platforms are where most of this generation access any information they are looking for. It makes sense that they would consider a platform they use on a daily basis for a variety of purposes as a reliable source for nutrition information.

There were three posts regarding the topic of food combining. Participants were able to correctly identify the post as misinformation for two of the 3 posts. However, when the information was presented in a different way, the majority of the participants were either incorrect or unsure in identifying misinformation on the third food combining post. The appearance and aesthetic of the post and who is giving the information could play a role into how reliable they believe that information to be. For example, given two

different posts, if one post is organized neatly and pleasing to the eye, but the other one is messy and unappealing, this could be why some participants were not consistent in recognizing the misinformation. The appearance of the person giving the information could also be a factor. If the person does not look professional or in any way qualified, participants might not believe they are reliable sources of information regardless of if they are actually qualified.

Additionally, there were two posts regarding the topic of “detox” drinks. While the majority of participants were either incorrect or unsure of both posts, one post had 14.29% more participants correctly identifying it as misinformation. Likewise, these findings could be due to how the information is presented.

The majority of participants were able to identify information given by a RD as accurate. These findings suggest that individuals who thought misinformation posts were correct also thought posts from RDs were correct, implying that these individuals believe all nutrition information on social media and do not realize the difference between sources of information. Additionally, findings could suggest that the same individuals who were able to identify misinformation as incorrect also were able to identify evidence-based information, implying that these individuals have a better understanding of nutrition knowledge and the prominence of misinformation on social media. Nevertheless, there was still a small number of participants that either thought the evidence-based information was incorrect or were unsure of how to answer. These participants could have a lack of nutrition knowledge but on the other hand not trust information given to them on social media. Additionally, these participants could have

been influenced by previous encounters with misinformation from diet culture telling them these evidence-based facts are not true.

After completing a T-test comparing the overall mean scores between courses, nutrition and biology, results indicated a significant difference with the biology students believing misinformation more frequently than nutrition students. Likewise, after completing a T-test comparing overall mean scores between males and females, results indicated a significant difference with males believing misinformation more frequently than females. This is supported by previous studies which have concluded that females have more nutrition knowledge than males (Husain et. al, 2021, Yahia et. al, 2016). Additionally, questions regarding detox drinks, drinking green juice on an empty stomach, quitting sugar, food combining, intermittent fasting, bloating, and exogenous ketones, had a significant difference in overall scores between courses nutrition and biology with the biology students having a higher mean score for these questions. This illustrates the lower nutritional knowledge that the students in the biology course have compared to the nutrition course. Furthermore, there was a significant difference in the mean scores between nutrition students and biology regarding the evidence-based post measuring if students recognize carbs are essential. More biology students than nutrition students believed that this evidence-based post was false, again illustrating the lower nutritional knowledge that the biology students have. These results could also indicate that these students have seen misinformation regarding carbohydrates on social media and used this past knowledge to answer this question.

Limitations of this study should be addressed. The presentation did not include every single nutrition misinformation topic that is published on social media.

Additionally, not all platforms of social media were used in the presentation. Lastly, participants could have copied what peers next to them said if they were unsure or if they felt pressured.

Further research is needed to completely understand the role that social media plays in accessing nutrition information. Future research should investigate how information is presented on social media affects whether or not someone perceives that information as accurate. Appearance and aesthetic of the post and who is providing misinformation should be taken into consideration when evaluating why individuals believe information they see on social media. Furthermore, platforms of social media should be compared to investigate if individuals believe more information presented on one platform over another. Moreover, age groups should be compared to examine if certain age groups are more prone to believing nutrition misinformation on social media. Comparing age groups that grew up with social media and older generations who were introduced to social media as adults could show significant results. This study should be repeated in the future with intentions of exploring if people are consistent with correctly or incorrectly identifying misinformation as well as if participants who were able to correctly identify misinformation can also correctly identify evidence-based information.

IMPLICATIONS

The present study has several implications for RDs, clinicians, and public health professionals. Not only is proper and adequate nutrition education essential but so is education on evidence-based research and recommendations. Students should be taught to investigate what they see on social media to determine if what they are reading is backed by research. Secondly, policies should be put in place to limit the spread of misinformation especially in regards to pro-eating disorder information. Recently Tik Tok implemented a policy on their platform that will remove any posts promoting eating disorders and disordered eating. They are partnering with researchers and professionals to put this policy in place. Lastly, RDs should recognize the need for a presence of media RDs on social media for two reasons. RD's are needed to promote evidence-based information on social media as well as debunking misinformation on social media.

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Appendix A

Labeled questions

Question number	Name on table 1	Description of topic the question is answering
1	Bullet Coffee	Is the participant able to distinguish if bulletproof coffee's claims are accurate?
2	Limit fruits/roots and go organic	Does the participant believe that roots and fruits should be limited for gut healing and you should only eat organic and raw foods?
3	Organic and raw is better	Does the participant believe you should only eat organic foods
4	Detox water	Does the participant believe detox water will lead to a flat belly
5	Variety of foods for gut	Does the participant believe the best thing for your gut microbiome is to eat a variety of foods
6	Drink juice on empty stomach	Does the participant believe that drinking green juice on an empty stomach will lead to better digestion
7	quit sugar	Does the participant believe that quitting all sugar will lead to balance of hormones, normal blood sugar, no inflammation, boosts gut health, supports brain health
8	Food combining	Does the participant believe the fad diet: food combining?
9	Snacks	Does the participant believe that snacks should be incorporated throughout the day and to pair a carb with a fat or protein
10	Intermittent fasting	Does the participant believe the fad diet: intermittent fasting
11	Are all fats healthy?	Is the participant able to distinguish between unsaturated fats and saturated fats?
12	Are carbs good or bad?	Does the participant believe that carbs are essential to the functioning of our bodies
13	Bloating	Does the participant believe that there is a set list of foods for everyone that cause bloating or de-bloating?

Labeled
Questions
(Continued)

14	Acidity in water	Does the participant believe that acidity in the body from water leads to diseases, acne and autoimmune issues
15	Food combining	Does the participant believe the fad diet: food combining?
16	Exogenous ketones	Does the participant believe that exogenous ketones will cause ketogenesis
17	Food combining	Does the participant believe the fad diet: food combining
18	Adele diet	Does the participant believe in Adele's diet: Sirtfood diet?
19	detox water	Does the participant believe detox water will lead to Weight loss?
20	Should you eat egg yolks	Does the participant believe eating egg yolk is bad for you?

