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Lost in Translation? Communicating Nutrition Science

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We did it!

ABSTRACT

Lost in Translation? Communicating Nutrition Science

Diet is directly correlated with overall health; therefore, nutrition is a critical piece of the obesity-epidemic puzzle. The news media has become a primary source for nutrition information yet results from International Food Information Council surveys indicate that the majority of Americans view the nutrition news they read as inconsistent and confusing. Very recent inquiry provides empirical evidence that nutrition confusion could be fueled by media. Nutrition confusion has been causally linked to "nutrition backlash," which is complete disregard for even the most strongly supported nutrition advice. Understanding how nutrition research is translated in the news media and the mechanisms that contribute to the translation remains an understudied gap in the literature. Therefore, the purpose of this study was to learn how the news media translates nutrition research and to describe the mechanisms of action in this phenomenon using the recent release of the Dietary Guidelines for Americans, 2020–2025 as a case study. This dissertation used methodological principles derived from critical realism, as defined by Wynn and Williams, as well as a six-phase reflexive thematic analytic approach, as developed and described by Braun and Clarke. Findings revealed that the perceptions drawn from the news media were skewed, covering "newsworthy" aspects of the release instead of translating the core nutrition news. It was found that this lack of translation was due to overarching mechanisms of financial incentives. This indicates there is room for improved translation. This work offers recommendations for increased collaboration between the government and the media as well as for future research, including evaluation of the hypothesized mechanisms and the potential to affect the higher levels of the outcomes chain.

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CHAPTER 1: INTRODUCTION

Background

Diet is directly correlated with overall health; therefore, nutrition is a critical piece of the obesity-epidemic puzzle. Americans are "serial" news consumers (American Press Institute, 2018), meaning that news is consumed no longer just daily but hourly in the United States. The news media has become a primary source for nutrition information, yet a majority of Americans view the nutrition news they read as inconsistent and confusing (International Food Information Council [IFIC], 2006, 2011, 2017). Unfortunately, this leads to larger problems, as nutrition confusion has been causally linked to "nutrition backlash," which is the complete disregard for even the most strongly supported nutrition advice (Clark et al., 2019; Lee et al., 2018). How can we, as a society, combat this confusion about nutrition? First, it is critical to understand what role the news media may play relative to nutrition confusion—that is, how is the news media translating nutrition research for the masses? Then, the mechanisms of action must be described and understood. Based on this understanding, program theories about needed changes and necessary implementation strategies can be designed, analyzed, and tested. Future research can use these findings (i.e., the *how* and *why*) to develop and test actionable steps for ensuring that the translation of nutrition research in print news no longer increases nutrition confusion but instead dissipates it. This translational science dissertation will provide research that can be built upon to achieve a key aim supporting translation of nutrition research in a "real-world setting" to ultimately make recommendations that will bridge the gap to improved health nationwide. This dissertation will translate the information learned through this critical exploration and explanation of news media reporting on nutrition research for future testing, using the recent

release of the Dietary Guidelines for Americans (DGA), 2020-2025 as a case study. Thus, this dissertation provides foundational knowledge that considers both the logical and conceptual, offering new perspectives to help find future solutions to combat this complex problem.

Problem Statement

As Frank Luntz (2008) famously said: "It's not what you say, it's how you say it." Consumers are looking for information in the news, but are they understanding it? The news media has become a primary source for nutrition information, yet a majority of Americans view the nutrition news they read as inconsistent and confusing (IFIC, 2006, 2011, 2017). However, understanding how nutrition research is translated in the news media and the mechanisms that contribute to the translation remains an understudied gap in the literature. This gap needs to be filled to provide the evidence base for recommending changes that could benefit society.

Recent inquiry by Clark et al. (2019) provides empirical evidence that nutrition confusion could be fueled by the media. They conclude, "Contradictory nutrition information in the news media can negatively affect consumers' attitudes, beliefs and behavioural intentions" (Clark et al., 2019, p. 3336). Furthermore, two studies suggest that nutrition confusion leads to subsequent nutrition backlash, defined as an ultimate disregard for nutrition recommendations (Clark et al., 2019; Lee et al., 2018).

Currently, the United States is fighting an obesity epidemic and skyrocketing health care costs. It is well established that there are strong links between diet and disease. Finding ways to decrease consumer confusion around nutrition will help begin to break a link in a very complex and expensive problem seen in America today.

Research Alignment

Maxwell's interactive model of research design provides an overview of this dissertation research and graphically illustrates the research alignment. This model provides the ability to address the specific considerations to developing a research proposal while allowing the research design to remain flexible and iterative (Maxwell, 2013). This is critical because an iterative approach was used for the current case study. A visual depiction of this study, based on the work by Maxwell (2013), can be found in Figure 1. Each aspect found within the model, goals, conceptual framework, research questions, methods, and validity/trustworthiness is summarized in this chapter, and more detailed explanations of each are provided throughout the dissertation. Using this model as a guide, I was able to confirm that each component of the research interacts with each other component appropriately and ensure alignment across the research as a whole.

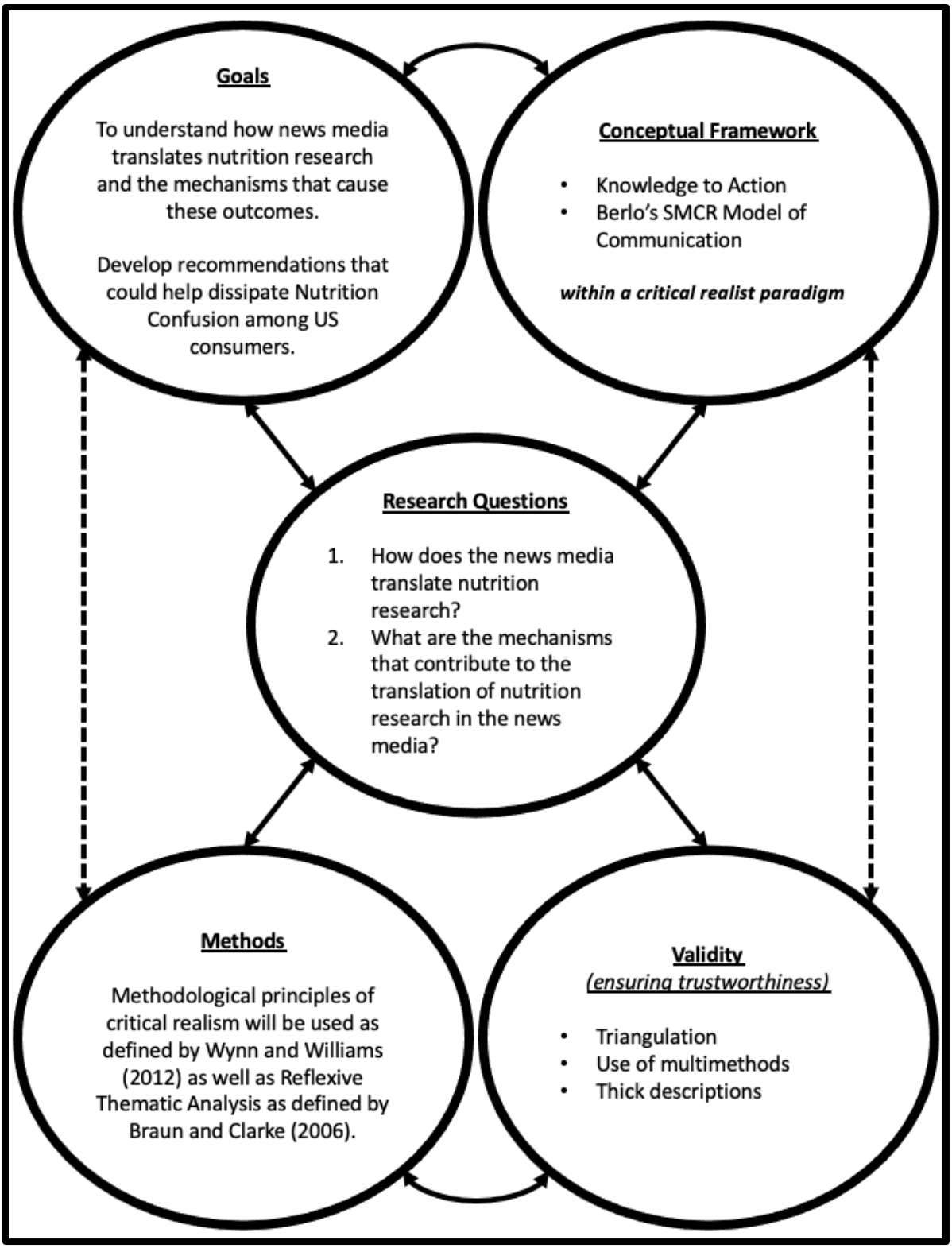

Figure 1: Research Alignment

Source. Adapted from Maxwell (2013).

Research Questions

This research is designed to help fill a gap in the scientific knowledge base concerning the news media's translation of nutrition research. The study research questions are as follows:

1. How does the news media translate nutrition research?
2. What are the mechanisms that contribute to the translation of nutrition research in the news media?

Goals

The goals of this study are to develop an in-depth understanding of the translation of nutrition research in the print news media. This research uses a case study design to allow detailed understanding of the translation and the mechanisms of action by review of a bounded event. The bounded event used in this case is the release of the Dietary Guidelines for Americans (DGA), 2020-2025 on December 29, 2020. Review of this singular event will allow for an in-depth understanding to be formed so I can provide recommendations, based on this case, to the key stakeholders.

Overview of Research Paradigm and Conceptual Framework

According to Bauer and colleagues (2015), a framework is a broad structurization of constructs organized descriptively; as such, a framework may provide a heuristic guide for how something should be implemented. Conceptually, frameworks can be developed by drawing upon the literature and mixing different variables into an organized concept that will guide one to achieving the goal. For this dissertation, I was able to structuralize key concepts from critical realism, knowledge translation, program theory, and translational health sciences to develop a guide for my research.

According to Sturmberg and Martin (2013), knowledge has multiple dimensions; it can be ordered and predictable or complex and unpredictable. The Cynefin framework was developed by Kurtz and Snowden (2003) to define a way to organize this complexity (see Figure 2). There are five domains: Simple, Complicated, Complex, and Chaotic, with Disordered in the center (represented by the gray shaded area in Figure 2). The goal is to grow knowledge that will allow research to move from one domain into the more ordered domain next to it—from complicated to simple, from complex to complicated, and so on. Nutrition science is full of complex problems that are challenging to solve because their cause-and-effect relationships are only realized in retrospect. This places the research of this nature in the upper-left chasm of the Cynefin framework—the Complex Domain (Kurtz & Snowden, 2003). To solve problems in the upper-left chasm, we must explore the data to find patterns that we can make sense of. Once sense of the complexity is made, researchers can start to respond and make best practice recommendations to solve the problem. That is what this work set out to do. I explored data to find patterns so I could make sense of how nutrition research is translated and what mechanisms lead to this. I can then build upon the research gap to recommend next steps for research and practice.

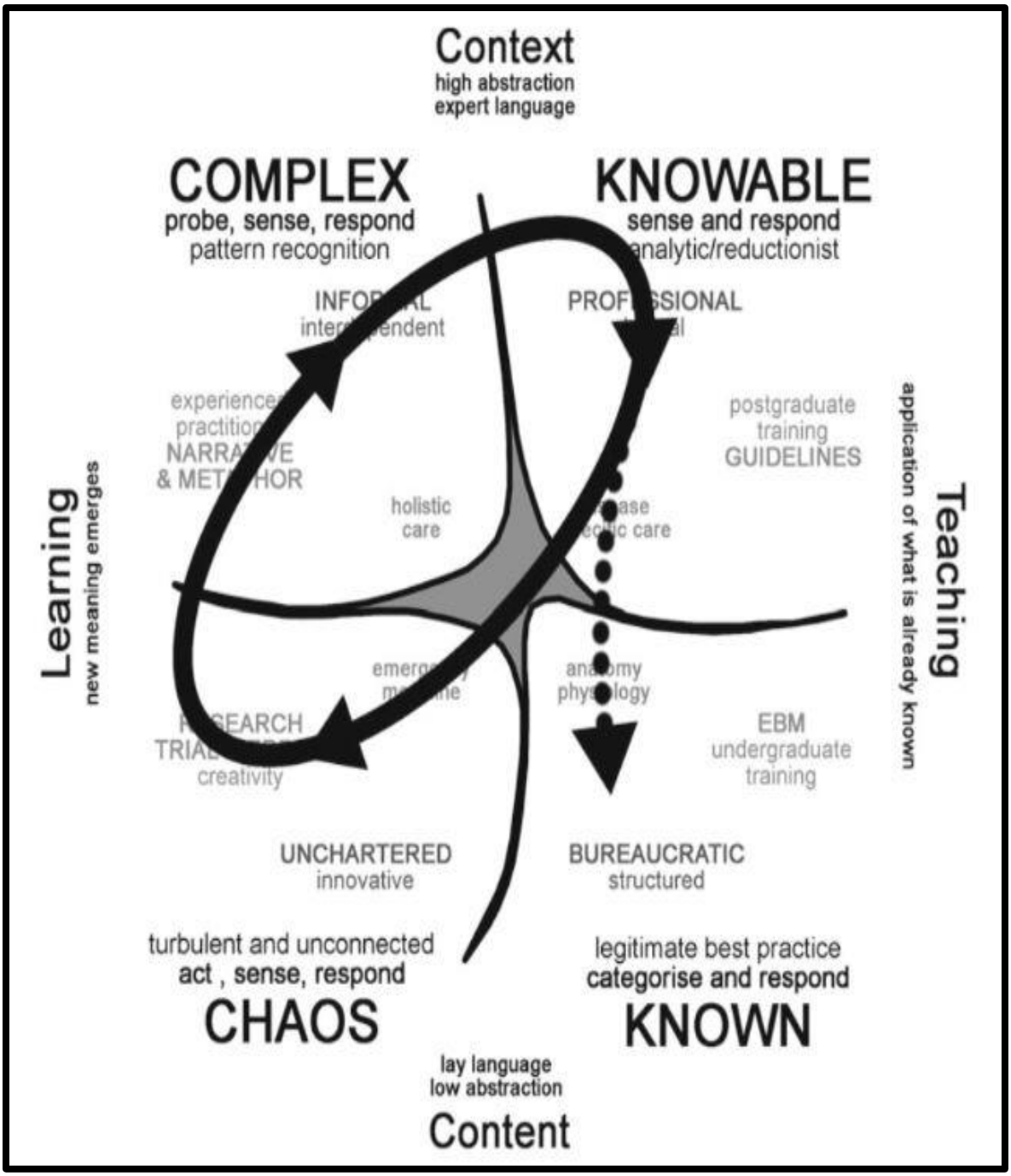

Figure 2: Cynefin Framework

Source. Sturmberg and Martin (2013).

Given this, researchers are tasked with attempting to move from the Complex Domain to the Knowable/Complicated Domain to solve these problems. This is where emergent practice lives and focuses on the identification of patterns, as seen in this dissertation study. The goal is to build knowledge that can move the problems into the Complicated Domain, followed by the Simple Domain, which is where best practice exists. Combining the Knowledge to Action (KTA) Framework by Graham et al. (2006) and the Source-Message-Channel-Receiver (SMCR) Model of Communication by Berlo (1960), this dissertation aimed to describe how nutrition science is being translated in the digital news media so that recommendations can be developed and pushed toward action, thereby advancing knowledge toward more ordered domains.

A critical realism lens was used in this qualitative study of how nutrition science is reported in the media. Critical realism, originally developed by Roy Bhaskar (1978), joins realism with subjectivism to analyze a problem and its underlying mechanisms (Fryer, 2020). Using a critical realism lens in a qualitative case study allows the researcher to look at the event occurring from multiple viewpoints. This multilevel exploration enables a critical realist to describe empirically derived "causation" (the *how* and *why* of an outcome), which is the goal of this dissertation.

Brief Summary of the Methodology

Case studies are often used to explore the interactions among context, mechanisms, and outcomes (for example, how nutrition science is reported, as examined here). In this study, the case of the release of the DGA, 2020-2025 will be analyzed with the goal of developing theory (or theories) from specific observations within the data. This dissertation used methodological principles derived from critical realism, as defined by Wynn and Williams (2012), as well as a six-phase reflexive thematic analytic approach, as developed and described by Braun and Clarke

(2006). These methodologies will be detailed in Chapter 3 and are summarized briefly here. Critical realism is characterized in a four-step process that I used iteratively to review the perspectives of the different realities that occurred on December 29, 2020. First, I described the events as they occurred (referred to as the Actual Domain). Next, I explored and described the events as they were perceived to have occurred, by way of the news media (in the Empirical Domain). I used reflexive thematic analysis (RTA) as a method for this work. I then used retroductive analytical techniques to determine the mechanisms that may have cause perceptions of the event to not match the event as it occurred. Finally, I corroborated my findings with an external expert and the relevant bodies of literature. I was able to use this information to develop recommendations for the key stakeholders in this case, including future researchers, government agencies, and journalists.

Trustworthiness

Triangulation is one important method for ensuring trustworthiness. I use triangulation with the literature throughout my work. I also empirically corroborated my findings with an expert in the field, another form of triangulation. Thick descriptions were used throughout my work, both in my notes and within the written dissertation, to ensure that the audience has a clear understanding of what was done to garner my findings. Finally, I incorporated multimethod approaches based on the literature for critical realism and content analysis.

Research Aims

The aims of the dissertation study are as follows:

- **Aim 1:** To conduct a thematic analysis of how nutrition research is translated in digital and print news media, using the Source-Message-Channel-Receiver (SMCR) Model of Communication by Berlo (1960). Reflexive thematic analysis

(RTA) was used to explore this event, describing how print news media is translating important peer-reviewed, published nutrition research.

- **Aim 2:** To build upon this thematic analysis to hypothesize mechanisms that contribute to the translation of nutrition research into digital print news media. Methodologies derived from critical realism were used to view the multilevel perspectives and create a theory (or theories) about the causal mechanisms that combined with the events as they occurred to generate the observed outcomes.

Research Significance

The study research questions were designed with the ultimate translational goal of developing recommendations for change that will contribute to changing consumer perceptions around nutrition science. As noted previously, the majority of Americans view the nutrition news they read as inconsistent and confusing (IFIC, 2006, 2011, 2017). This confusion can lead people to disregard nutrition recommendations, which is known as nutrition backlash (Clark et al., 2019; Lee et al., 2018). It is well evidenced that nutrition and health are positively correlated, meaning that a lack of regard for nutrition recommendations could ultimately lead to decreases in health and increased morbidities and health costs down the outcomes chain. The ultimate goal of this research is to help fill the evidentiary gap in the literature regarding the translation of nutrition research by the news media and the mechanisms that contribute to this phenomenon. As seen in this dissertation study, research was completed in the KTA knowledge creation funnel, specifically using Berlo's model to thematically describe the news media. Based on that description, theories about contributing mechanisms were developed through a process of theoretical sampling using the news media data. Recommendations for increased collaboration between government and the media were developed, as were recommendations for future

research, including evaluation of the hypothesized mechanisms and potential to affect the higher levels of the outcomes chain.

Definitions of Key Terms

- **Abstraction:** Abstraction (also called explication) is the process of describing the data and the observations within the data through identifying detailed aspects of the events (both the context and the outcomes) being studied (Wynn & Williams, 2012) (see Figure 10).
- **Actual Domain:** Critical realism requires the stratification of reality into three nested domains (Bhaskar, 1978). The Actual Domain is the level of reality through which the event as it actually occurred is viewed.
- **Code:** The code is how the message is presented or the form the message is in (i.e., digital, print, etc.) (Berlo, 1960).
- **Content:** The content is what the message is, from start to finish, what is being delivered to the audience in the written word (Berlo, 1960).
- **Context:** In critical realism, the Actual Domain is what is actually happening (not necessarily what was experienced); what actually happened can also be considered the context for the event.
- **Critical Realism:** Critical realism is a branch of philosophy that provides a lens for research. Critical realists take a multilevel view of reality to differentiate between the "real" world and the "observable" world (University of Warwick Education Studies, n.d.).

- **Deductive Reasoning (Deduction):** Deductive reasoning is a research approach in which the researcher starts with a hypothesis and examines data to validate or nullify that hypothesis.
- **Dietary Guidelines for Americans (DGA):** A document developed jointly by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services. This document includes science-based dietary recommendations and sets the stage for all U.S. nutrition policies.
- **Digital Print News Media:** Articles published in the popular press, specifically in a digital format (online news website or publication application).
- **Element(s)**: The element(s) are what accompanies the message (i.e., graphics, images, charts, etc.) (Berlo, 1960).
- **Empirical Corroboration:** Empirical corroboration uses the outcomes (the data in the domain of the empirical) to review the hypotheses as retroduced and ensure adequate causal/explanatory power of the hypotheses (Hu, 2018). Empirical corroboration is a method of triangulating the data, ultimately impacting the trustworthiness of the study.
- **Empirical Domain** (per Critical Realism): Critical realism requires the stratification of reality into three nested domains (Bhaskar, 1978). The Empirical Domain is the level of reality through which the events as they were perceived are viewed.
- **Inductive Reasoning (Induction):** The opposite from deductive reasoning, inductive reasoning is a research approach in which generalized conclusions (or predictions) are drawn from combining observations.

- **Knowledge to Action (KTA) Framework:** Developed by Graham et al. (2006), KTA is a key framework in translational health sciences, as it provides steps for moving knowledge into action. It includes building knowledge within the knowledge funnel and moving knowledge to action within the following action cycle.
- **Mechanisms:** The causal powers or conditional tendencies that lead to the potential to do certain things, not other things (Wynn & Williams, 2012). Originally, Bhaskar (1978) defined mechanisms in critical realism as "nothing other than the ways of acting of things" (p. 14).
- **Nutrition Backlash:** Nutrition backlash constitutes "negative beliefs about nutrition recommendations and research" (Nagler, 2014, p. 25), leading to complete disregard for even the most strongly supported nutrition advice such as the health benefits of fruit and vegetable intake (Clark et al., 2019; Lee et al., 2018).
- **Nutrition Confusion:** Lack of consumer understanding around nutrition or "perceived ambiguity about nutrition recommendations and research" (Nagler, 2014, p. 25).
- **Outcomes:** In critical realism, the Empirical Domain is what we perceive or experience; what is experienced can also be considered the outcome(s).
- **Program Theory:** Per Funnell and Rogers (2011), program theory is the causal process of developing and evaluating a program. A "program" could be any intervention (a program, project, strategy, policy, funding initiative, event, etc.), and the theory (sometimes referred to as logic) focuses on the logical sequence of how the program optimally works. It is composed of a Theory of Change and a Theory of Action.

- **Real Domain:** Critical realism requires the stratification of reality into three nested domains (Bhaskar, 1978). The Real Domain is the level of reality through which the mechanism(s) are viewed and/or understood.
- **Reflective Thematic Analysis:** RTA is a six-phase, flexible approach used to explore different perspectives by building themes from codes as developed and described by Braun and Clarke (2006).
- **Retroductive Reasoning (Retroduction):** Retroduction is a form of reasoning used in critical realism to hypothesize mechanisms that can be observed from the data explaining the events (as occurred and as perceived, also known as the context and outcomes, respectively) (Vincent & Wapshott, 2014). Retroductive reasoning is used to combine the data in unique ways until plausible mechanisms are observed and recorded.
- **Source-Message-Channel-Receiver (SMCR) Model of Communication:** A model (see Figure 6) that builds on the original theory of communication (Shannon & Weaver, 1949) and is described by Berlo as "a model of the ingredients of communication" (1960, pp. 23–24). The Berlo model provides specific factors for each of the "ingredients." Note: In some papers, the "source" is referred to as the "sender."
- **Stratified Realities:** Critical realism requires the stratification of reality into three nested domains (Bhaskar, 1978): the Actual Domain, the Empirical Domain, and the Real Domain. This stratified, or multilevel, view of the world used by critical realists offers the ability to look at multiple perspectives.

- **Structure:** The structure of the message is how it is arranged (i.e., headings, subheadings, multiple topics, etc.), per Berlo (1960).
- **Theoretical Sampling:** Theoretical sampling is defined as the process of collecting data to generate a theory or theories. It requires the researcher to "iteratively collect, code, and analyze the data in order to develop a theory as it emerges" (Glaser & Strauss, 1967).
- **Theory of Action:** A Theory of Action provides the desired attributes of the intended outcomes, the program features, the external factors and how these factors are addressed, and the resources, activities, and outputs of the program. This theory defines each successful outcome, including what the success would look like and what would constitute effective program performance (Funnell & Rogers, 2011).
- **Theory of Change:** A Theory of Change is a method for determining the nature and extent of a problem, including a situational analysis and scoping of a problem. It results in the development of an outcomes chain, which links the programs intended outcomes (effectively linking the Theory of Change to the Theory of Action) (Funnell & Rogers, 2011).
- **Thick Descriptions:** This qualitative research technique invented by Gilbert Ryle and Clifford Geertz instructs the researcher to incorporate detailed narratives, including context, providing the "background information necessary for understanding the relevance" (Drew, 2021).
- **Translational Health Science:** Research that focuses on closing the gap between the production of evidence and the implementation of those findings—specifically, closing gaps along the T spectrum (see also Figure 7).

- **Treatment:** The treatment is how the message is conveyed to the audience (i.e., the tone of the writing) (per Berlo, 1960).
- **Triangulation:** Triangulation is a way of ensuring validity or trustworthiness in research by collecting data in multiple ways, using more than one method, for data on the same topic.

CHAPTER 2: LITERATURE REVIEW

Search Strategy and Comprehensiveness of Search

The complete search, which was conducted between September and November 2019, included the following database searches: three in PubMed, three in SCOPUS, five in the Health Policy Reference Center, and two in PsycINFO. Two additional multi-database searches were conducted to cover the breadth of the topic; the final searches returned almost exclusively duplicative articles from previous searches, indicating that the searches were sufficient. These databases were chosen because they are the larger databases within the nutrition and public health domains. The search process began with PubMed and the following searches were performed:

- **PubMed Search 1:** PubMed; nutrition AND media AND confusion // ("nutritional status"[MeSH Terms] OR ("nutritional"[All Fields] AND "status"[All Fields]) OR "nutritional status"[All Fields] OR "nutrition"[All Fields] OR "nutritional sciences"[MeSH Terms] OR ("nutritional"[All Fields] AND "sciences"[All Fields]) OR "nutritional sciences"[All Fields]) AND media[All Fields] AND ("confusion"[MeSH Terms] OR "confusion"[All Fields])
    - 31 results: 22 selected based on title relevance
- **PubMed Search 2:** PubMed; "nutrition confusion" AND/OR "contradictory nutrition" // contradictory[All Fields] AND ("nutritional status"[MeSH Terms] OR ("nutritional"[All Fields] AND "status"[All Fields]) OR "nutritional status"[All Fields] OR "nutrition"[All

Fields] OR "nutritional sciences"[MeSH Terms] OR ("nutritional"[All Fields] AND "sciences"[All Fields]) OR "nutritional sciences"[All Fields])

    - 662 results: 1 selected based on title relevance

- **PubMed Search 3:** PubMed; "nutrition confusion" // "nutrition confusion"[All Fields]
    - 2 results: both duplicates of previous searches
- **SCOPUS Search 1**: SCOPUS; nutrition AND media AND confusion
    - 43 results: 21 selected based on title relevance; 18 duplicates
- **SCOPUS Search 2:** SCOPUS; "contradictory nutrition"
    - 6 results: 4 selected based on title relevance; 3 duplicates
- **SCOPUS Search 3:** SCOPUS; diet AND media AND confusion
    - 75 results: 17 selected based on title relevance; 11 duplicates
- **Health Policy Reference Center Search 1:** HPRC; nutrition AND media AND confusion
    - 6 results: 4 selected based on title relevance; 3 duplicates
- **Health Policy Reference Center Search 2:** HPRC; nutrition AND communication AND confusion
    - 6 results: 5 selected based on title relevance; 3 duplicates
- **Health Policy Reference Center Search 3:** HPRC; nutrition confusion
    - 1 result: 1 duplicate
- **Health Policy Reference Center Search 4:** HPRC; contradictory nutrition
    - 1 result: 1 duplicate
- **Health Policy Reference Center Search 5:** HPRC; diet AND media AND confusion
    - 2 results: 2 duplicates

- **PsycINFO Search 1:** PsycINFO; nutrition AND communication AND confusion
    - 12 results: 6 selected based on title relevance; 4 duplicates
- **PsycINFO Search 2:** PsycINFO; contradictory nutrition
    - 3 results: 3 duplicates
- **Multi-database Search 1:** PsycINFO;Health Policy Reference Center;MEDLINE;Historical Abstracts with Full Text;Associated Press Images Collection; nutrition confusion
    - 4 results: 4 duplicates
- **Multi-database Search 2:** PsycINFO;Health Policy Reference Center;MEDLINE;Historical Abstracts with Full Text;Associated Press Images Collection; contradictory nutrition
    - 6 results: 4 selected based on title relevance; 4 duplicates

Discovered articles were managed via a bibliography chart in Microsoft Excel. All articles were compiled, and then duplicates were removed. A screening by title and abstract was done, followed by a full-text review. Exclusion criteria were kept to a minimum; articles that were not relevant to the topic or not in English were removed. George Washington University librarians assisted to 1) ensure that the correct keywords were being used and no relevant keywords were excluded and 2) gain access to additional articles that could not be easily obtained through the George Washington University Himmelfarb Library online portal.

Given the limited amount of literature found (only 33 total articles moved forward from full-text review), additional reference mining was used to find relevant science from other fields of study such as communication science. Reference mining proved fruitful for this purpose. The grey literature (e.g., policy reports, white papers, external surveys, and government documents)

was also searched. I searched prominent and reputable organization websites for relevant grey literature that could contribute to this work, as needed. For example, the Pew Research Center and IFIC had relevant reports that contributed to this work. I also used the U.S. Department of Agriculture (USDA) and Department of Health and Human Services (HHS) websites throughout the process, specifically DietaryGuidelines.gov and the DGA ancillary sites. The PRISMA flow chart in Figure 3 describes the literature search process.

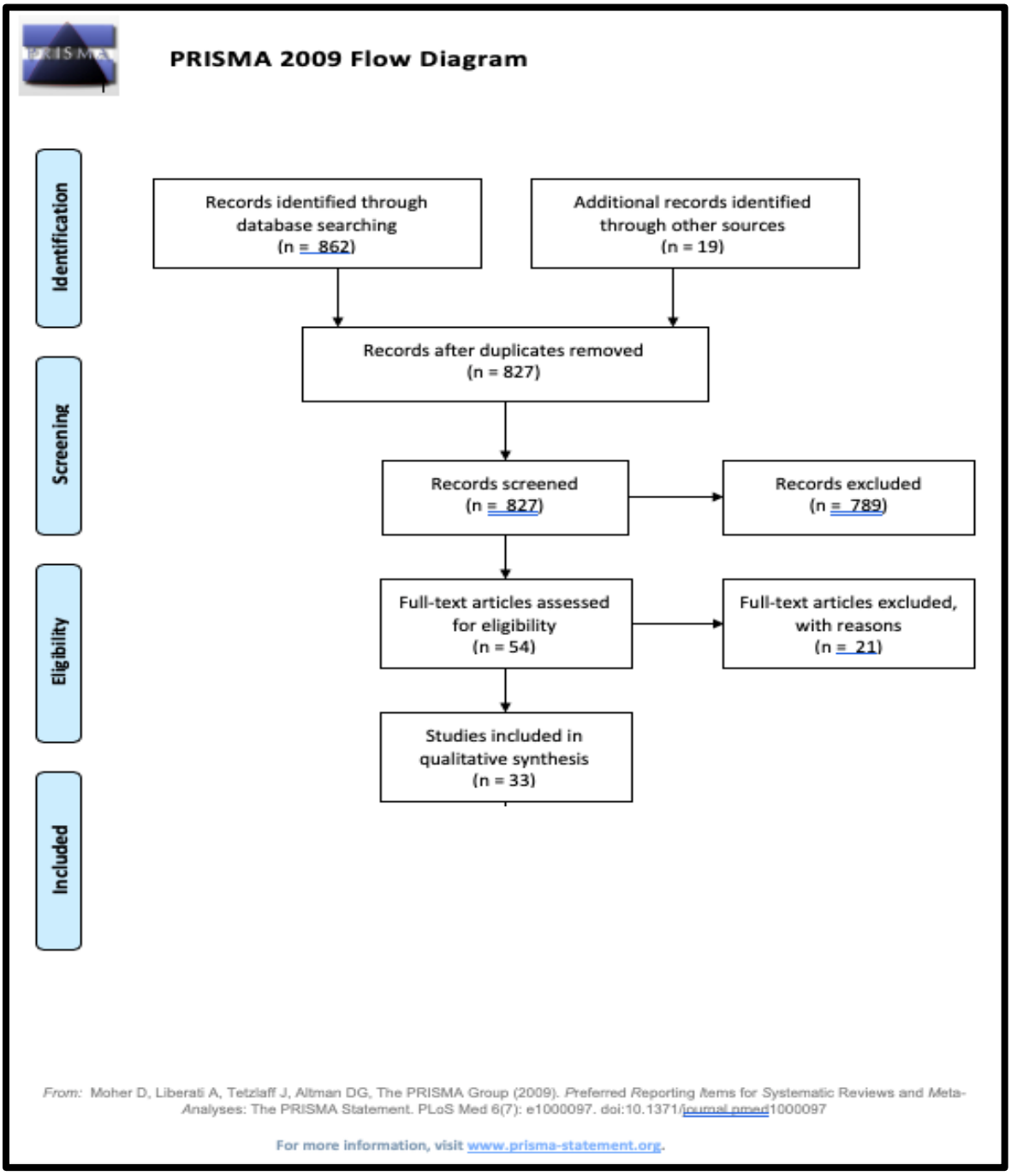

Figure 3: PRISMA Flow Chart

Description and Critique of the Scholarly Literature

This research combines the fields of nutrition science, communication science, and translational science, as detailed in the earlier literature review description in this chapter.

Nutrition Science

Nutrition and Health

It is increasingly understood that nutrition and diet play key roles in U.S. health care costs. The Centers for Disease Control and Prevention (2018) estimates that 90% of health care costs are spent on chronic diseases, with over half of these diseases having a direct relationship to diet. A shift in the American diet, which could in turn decrease obesity and comorbidities among the population, could lead to significant cost savings. But what is a healthy diet? Does anyone know?

As Katz (2015) notes, there is a prevailing opinion that no nutrition experts agree or that expert advice on nutrition changes constantly, yet there is actually "global consensus among experts about the fundamentals of eating well." The DGA, which set nutrition policy for the United States, have remained largely unchanged since their inception in 1980. For the last 40 years, the DGA have focused on key recommendations for a healthy dietary pattern that includes a balance of all foods, emphasizing more healthful components and limiting those that are less healthy through small dietary "shifts" (HHS & USDA, 2015). Similarly, the Academy of Nutrition and Dietetics (formerly the American Dietetic Association) also supports a total diet approach; this means that while all foods may be consumed, they should be consumed in appropriate portion sizes (Nitzke et al., 2007).

Every 5 years, the USDA, jointly with HHS, engages in a multiyear process to update the DGA. In this process, a federal advisory committee of nutrition experts known as the Dietary Guidelines Advisory Committee (DGAC) reviews the relevant science to answer specific topics and questions via systematic review, food pattern modeling, and data analysis. The DGAC then uses this review to make overarching recommendations for national dietary guidance to the USDA and HHS. These scientific recommendations are then synthesized by the USDA and HHS into the DGA. The DGA report is peer reviewed and published by the USDA and HHS, and it includes holistic and fundamental dietary guidance for health promotion and disease prevention. The DGA report is used by health care professionals for health and dietary education and by policy makers, and it serves as the basis of all federal feeding programs, policies, and education developed by the U.S. government for the next 5 years. The DGA is a publicly available dietary resource, and the USDA and HHS also develop and release an abundant supply of consumer resources to accompany the full report. The most recent process was closely followed by the news media and culminated in the release of the DGA, 2020-2025 on December 29, 2020.

Despite the ample and well-established evidence about what behaviors promote health, the average American diet has much room for improvement, meaning consumers are generally not following the DGA recommendations. This can be exemplified in the current American Healthy Eating Index (HEI) score, which is a system that scores how closely a diet aligns with the DGA (USDA & HHS, 2020a). The HEI scoring system can be used in a variety of ways in addition to longitudinal monitoring of dietary quality—for example, evaluating nutrition intervention programs or assessing menu quality (for research or in nutrition programs, etc.) (Mosher et al., 2014). HEI scores range from 0 to 100, and Americans currently average a score of 59 out of 100. Importantly, this score has not increased in the last decade. In fact, while

marginal improvements were starting to emerge in the early 2000s, those have since declined. This is a critical concern of the DGA and is discussed in the introductory chapter of the most recent edition (USDA & HHS, 2020a), as seen in Figure 4.

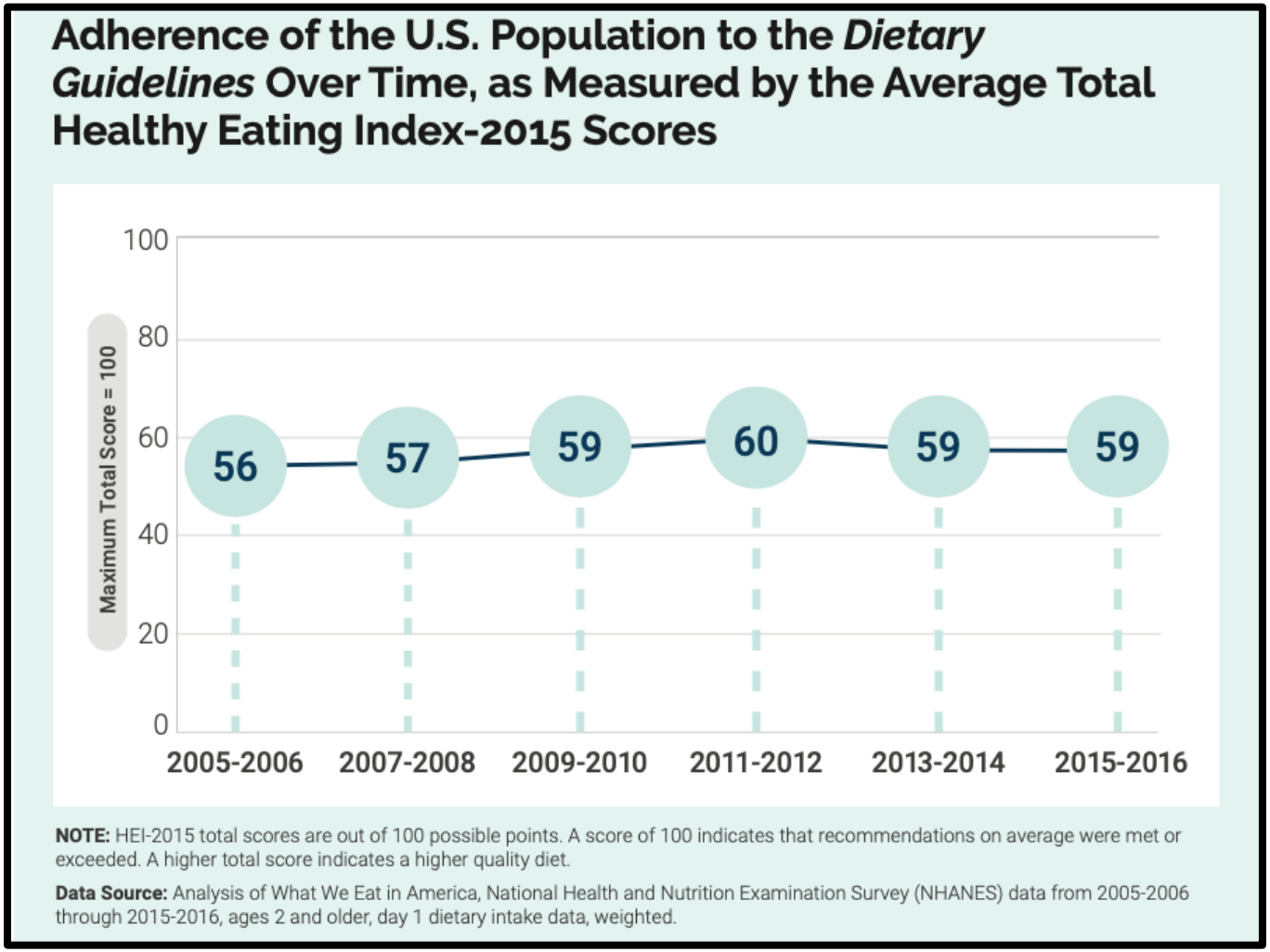

Figure 4: Healthy Eating Index Scores Over Time

Source. Excerpted from USDA and HHS (2020a, p. 4).

As explained in the current DGA, the goal is to provide recommendations that will promote health to the average American and help prevent future disease, including among individuals with a healthy weight, overweight, or obesity, The DGA have been released every 5 years since 1980, providing progressively more comprehensive and detailed information on nutrition. Yet as shown in Figure 4, the dietary quality of Americans is not improving as more information becomes available. Review of HEI scoring provides evidence that there is more to be done when it comes to American dietary behaviors but does not explain why. As more information has become available, why are dietary behaviors not changing? Based on the recent evidence regarding nutrition confusion and nutrition backlash, there could be a potential link between a lack of consumer understanding and a subsequent lack of consumer behavior change.

While general nutrition advice (i.e., eat more fruits and vegetables) has been stable for decades, nutrition science continues to evolve. Therefore, the guidelines have evolved to become more specific and nuanced regarding the advice provided. For example, while limiting sugars (specifically added sugars) has been a long-lasting staple of the guidelines, in 2015 more specificity was added, stating that Americans should limit added sugars in their diet to less than 10% of calories (HHS & USDA, 2015). While this is not a vast departure from past guidance, it created major headlines throughout 2015. Throughout the process to develop the 2020 DGA, this dietary debate continued to play out in the media. Importantly though, since the very first edition of the DGA in 1980 and in every edition since then, the DGA have emphasized the reduction of sugars. Further, disputes about specific dietary aspects, such as amounts and forms of sugars that should be consumed in an ideal dietary pattern, have recently begun to play out in the media more frequently, proliferating conflicting messages (Katz et al., 2018). These “dietary debates” playing out in the mainstream media can lead to negative effects in two ways, per Clark et al.

(2019). First, they can influence how people make short-term dietary decisions (in comparison to long-term healthy lifestyle changes). Second and potentially even more concerning, future efforts of nutrition communication may be compromised. Again, using sugars as an example, there is not a question, when looking at the research or the DGA, that the overwhelming recommendation for Americans is that dietary intake of sugars should be reduced. There should not be confusion in this regard. If the media causes confusion in this regard, the behavior may not change because, as discussed next, nutrition backlash is a disregard for even strongly supported science such as reduction of sugars.

Nutrition Confusion

One of the primary sources of information for consumers in the United States is the news media (Di Sebastiano et al., 2019; IFIC, 2006, 2011, 2017, 2018). In fact, two-thirds of Americans say they will use media sources to find food and nutrition information (IFIC, 2011). The news media (specifically television, newspapers, or magazines) was determined to be the top place Americans think they have seen "some information" about the DGA (IFIC, 2011). If nutrition science is not, in fact, constantly changing, then why are consumers confused? Consumers do not think the food and health information they are getting is consistent across sources, with only one-third of consumers believing there is some level of consistency (IFIC, 2006). Experts in this space suggest that in the present media environment, "a news cycle that does not feature hyperbolic headlines about diet is a rarity" (Katz et al., 2018, p. 1453). This suggestion is supported by research from Basu and Hogard (2008) and Kininmonth et al. (2017). For example, Kininmonth et al. (2017) acknowledge that "journalists must make the story 'eye-catching' and 'appealing' for the public" but that this can lead to "sensationalist reporting or alarmist headlines" (p. 6). This may be part of the problem. Per Gardner and Stanton (2014), "the

media commonly reports on what appear to be shocking contradictions and reversals in studies of diet and health… In truth, the findings from these studies are rarely as diametrically opposed to one another as the media portrays in a bid to capture the attention of their audience" (p. 30). Here is an example: One day, eggs are nutritious because they are high in protein and choline—two nutrients important for health. This research makes headlines. A few weeks later, eggs are reported to be harmful if consumed in high quantities because they are high in cholesterol. This research makes headlines. These are striking contradictions that leave consumers questioning what is right. Anecdotally, I consistently see news headlines trying to capture the attention of the audience. In many cases, however, especially cases where I know more than the general public about the topic area, I find critical context may be missing or inappropriately framed to garner attention. This gap between the media's portrayal of events and the event itself needs to be further explored.

A recent inquiry by Clark et al. (2019) provides empirical evidence that nutrition confusion could be fueled by the media. For example, the authors concluded that "contradictory nutrition information in the news media can negatively affect consumers' attitudes, beliefs and behavioural intentions" (p. 3336). Lack of consumer understanding about nutrition, known as "nutrition confusion," has been shown to increase adverse health outcomes (Lee et al., 2018; Nagler, 2014). Evidence shows that nutrition confusion can lead to disregard for even the most strongly supported nutrition advice, known as "nutrition backlash" (Lee et al., 2018; Nagler, 2014). For example, research shows that when someone is confused about the health effects of wine, coffee, or seafood, they will more commonly ignore even the most basic and scientifically supported nutrition advice, such as advice about increasing consumption of fruits and vegetables

or increasing physical activity (Lee et al., 2018). Consumers simply give up due to nutrition confusion.

Consumers are interested in the continual evolution of nutrition science, and nutrition researchers (persons doing research within the field of nutrition) routinely generate new findings. When scientists report their findings, they are traditionally communicated to others within the scientific community through publishing in peer-reviewed journals or presenting at conferences (Nguyen, n.d.), meaning consumers are left in the lurch in terms of understanding these new findings. The lack of active translation of knowledge to this group, therefore, leaves journalists to fill the void. If media reporting of scientific findings is not accurate, it can lead to the variety of consequences discussed. As Rippe (1996) wrote in a supplement for the *American Journal of Clinical Nutrition*,

> Publication of findings are "works in progress" that build on previous research, draw limited conclusions, express appropriate cautions, and point the way toward future research. These results, when published in peer-reviewed journals, are intended for other scientists and physicians. In a headline-dominated society in which stories based on articles from the *New England Journal of Medicine, Journal of the American Medical Association, Science,* and *Nature* routinely appear on the front page of major daily newspapers, it is not surprising that conclusions are reported in the popular press with too much certainty and with cautions underemphasized or ignored completely. (p. 471S)

While Rippe provides an interesting perspective, empirical evidence on the translation of nutrition research in mainstream media continues to be a gap in the literature.

Nutrition Translation and Communication

Given the discussed expert opinion that, at present, nutrition communications may be contributing to nutrition confusion, it can be assumed that knowledge translation in nutrition needs to become more effective. In fact, the need to improve the efficiency and effectiveness of knowledge translation in nutrition has recently come into focus for nutrition-related professional associations such as the American Society for Nutrition. At a recent summit, it was determined that a key priority for the society's next 10 years is to focus on more proactive translation of research and knowledge (American Society for Nutrition, 2018). Further, major associations have accepted a variety of sessions at their annual conferences on this topic to advance discussions around communicating nutrition science in an improved way, including the American Society for Nutrition, the Academy of Nutrition and Dietetics, and the American Public Health Association, among others.

Further, in an expert opinion piece published in *JAMA* in October 2019, nutrition experts called for research to "establish best practices for media relations to help reduce hyperbole surrounding publication of small, preliminary, or inconclusive research with limited generalizability" (Ludwig et al., 2019, p. 1550). As awareness evolves around this dichotomy between the research itself and the portrayal in the media, there needs to be a resolution for this problem. However, complex problems cannot be solved without an understanding of the issue, and this issue has not been fully explored in the literature. Calls for this line of research are not new; articles date back to the early 1990s. The following are some examples.:

- Goldberg (1992) stated, "For consumers, the result [of complex diet-health messages has] been not only confusion but, at times, outright rejection of reasonable recommendations" (p. 71). This phenomenon is now known as nutrition backlash, as discussed earlier.

- Lupton and Chapman (1995) found that "while the participants commonly articulated concern about their diet, they also expressed a high degree of cynicism both in the news media's coverage and health promotional advice on diet and cholesterol control" (p. 477).
- Katz et al. (2018) determined that "[s]uch confusing nutrition messages from scientists, the media, the food industry, and other sources have made it all but impossible for any single authority to convey persuasively the fundamentals of healthful eating" (p. 1452).
- Finally, Di Sebastiano et al. (2019) reported that "[s]kepticism and confusion around evidence linking diet and nutrition [with cancer] may arise, in part, through ineffective media KT [knowledge transfer]" (p. 410).

Again, there is not empirical evidence inquiring directly as to how the news media translates published, peer-reviewed nutrition research. Further, while there is a clear assumption that the translation is ineffective, as evidenced by the calls for change dating back to the 1990s, there is not empirical evidence that describes the mechanisms for why it may be translated in a way that is confusing, hyperbolic, or even skepticism inducing, as experts have stated. This is a literature gap that needs to be filled before conclusions can be drawn. In fact, the actual content, context, and reporting of nutrition research is widely understudied. A comprehensive literature review found only two studies (both of British media) looking at this line of inquiry. These studies concluded that the "information given is rarely balanced or sufficiently contextualized to be of practical or evidenced use" (Basu & Hogard, 2008, p. 1127). Further, Basu and Hogard (2008) found that "the majority of research results were reported inaccurately, and headlines were inconsistent with the true nature of the original research reported" (p. 1127). This raises the question of how the reporting compares to the headline itself. Is the reporting more consistent with the research even if the headlines are inconsistent with the research? Robinson et al. (2013)

looked at health research reporting more generally within a variety of British newspapers, and they found that the volume and quality of reporting was highly variable. Neither the literature review nor reference mining returned any empirical studies looking at prominent U.S. news media in this regard. However, two studies within the United States did suggest that media (both print and broadcast) do lead to both nutrition confusion and nutrition backlash among Americans (Clark et al., 2019; Lee et al., 2018). However, much of this research, while ultimately limited, has studied all media as opposed to separating out sources. While this has helped lead to the findings that media, generally, leads to confusion, there have been calls to separate out sources to be more focused and to determine which sources may lead to more (or less) nutrition confusion (Nagler & Hornik, 2012). Building upon this, this project considers the context and separates print news media for empirical inquiry. This approach was chosen for several reasons, such as the availability of sources and mixed results in past research on the accuracy and/or quality of print news media sources. To work toward filling this gap in the literature through empirical study, the research must bridge the siloes of nutrition science and communication science.

Communication Science

Communication science provides several theories and models this research can draw from to support this inquiry, which is at the intersection of nutrition science and communication science. Communication science is a much more developed field than the field of nutrition, so consideration of how to best promote nutrition science should draw on theories previously developed for communications broadly. For example, the original mathematical theory of communication was developed by Shannon and Weaver in 1949. This can provide an outline for considering how nutrition research is translated by the media to consumers, as illustrated in Figure 5.

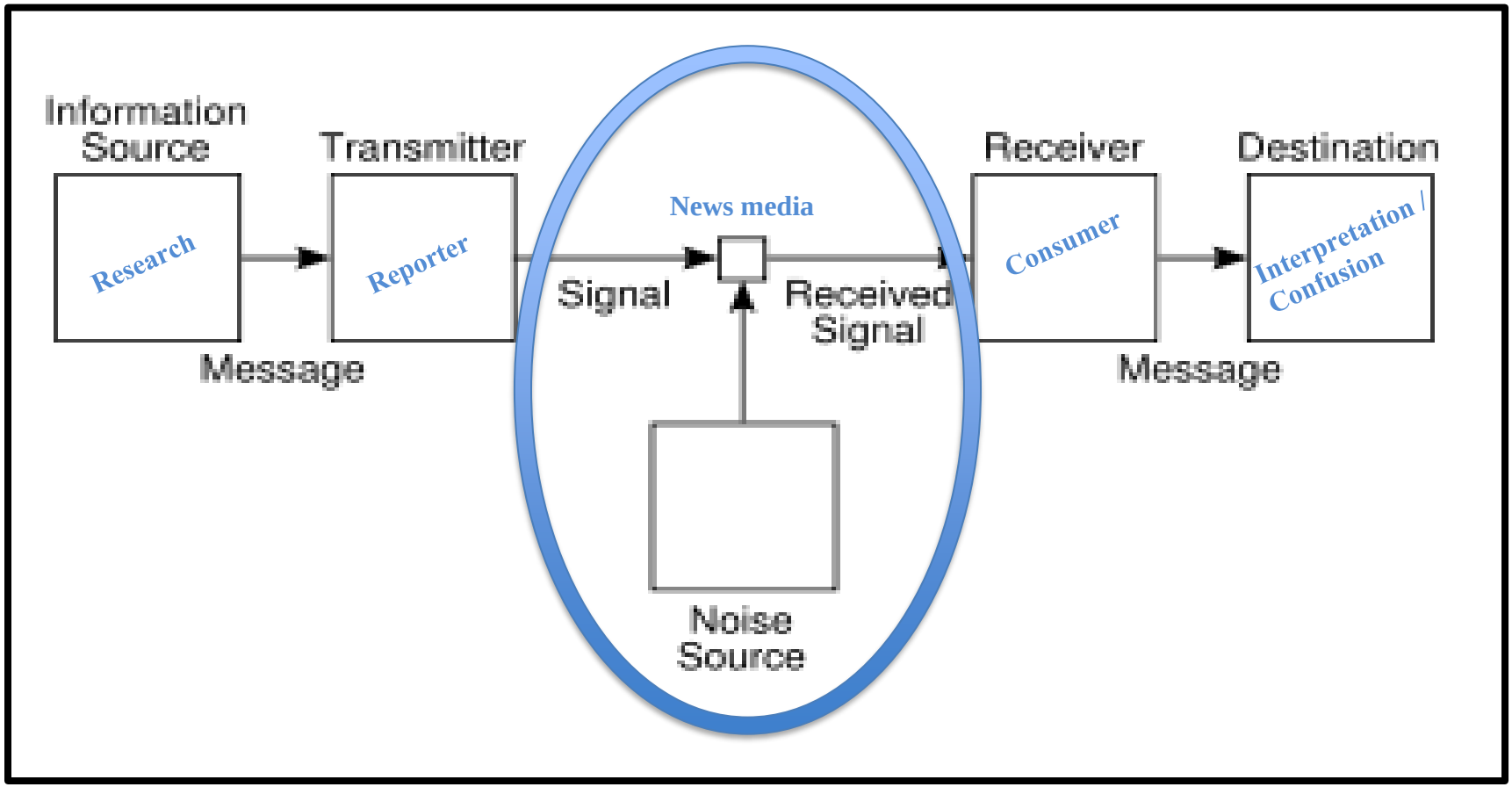

Figure 5: Adapted Mathematical Theory of Communications

Source. Adapted from Shannon and Weaver (1949).

In 1960, Berlo built upon the Shannon and Weaver model to create the SMCR model of communication (Figure 6), which he referred to as “a model of the ingredients of communication” (pp. 23–24). The Berlo model provides specific factors for each of the “ingredients” that can be explored. It is these ingredients, specifically the message and how it is encoded by the source, that need to be studied. According to the Berlo model, the source (i.e., the origin of the message) encodes the message and the message contains a number of elements that can be assessed, including the following:

- The content of the message (i.e., what the message is, start to finish)
- The elements of the message (i.e., what accompanies the content)
- The treatment of the message (i.e., how it is conveyed)
- The structure of the message (i.e., how it is arranged)
- The code of the message (i.e., how/in what form the message is in)

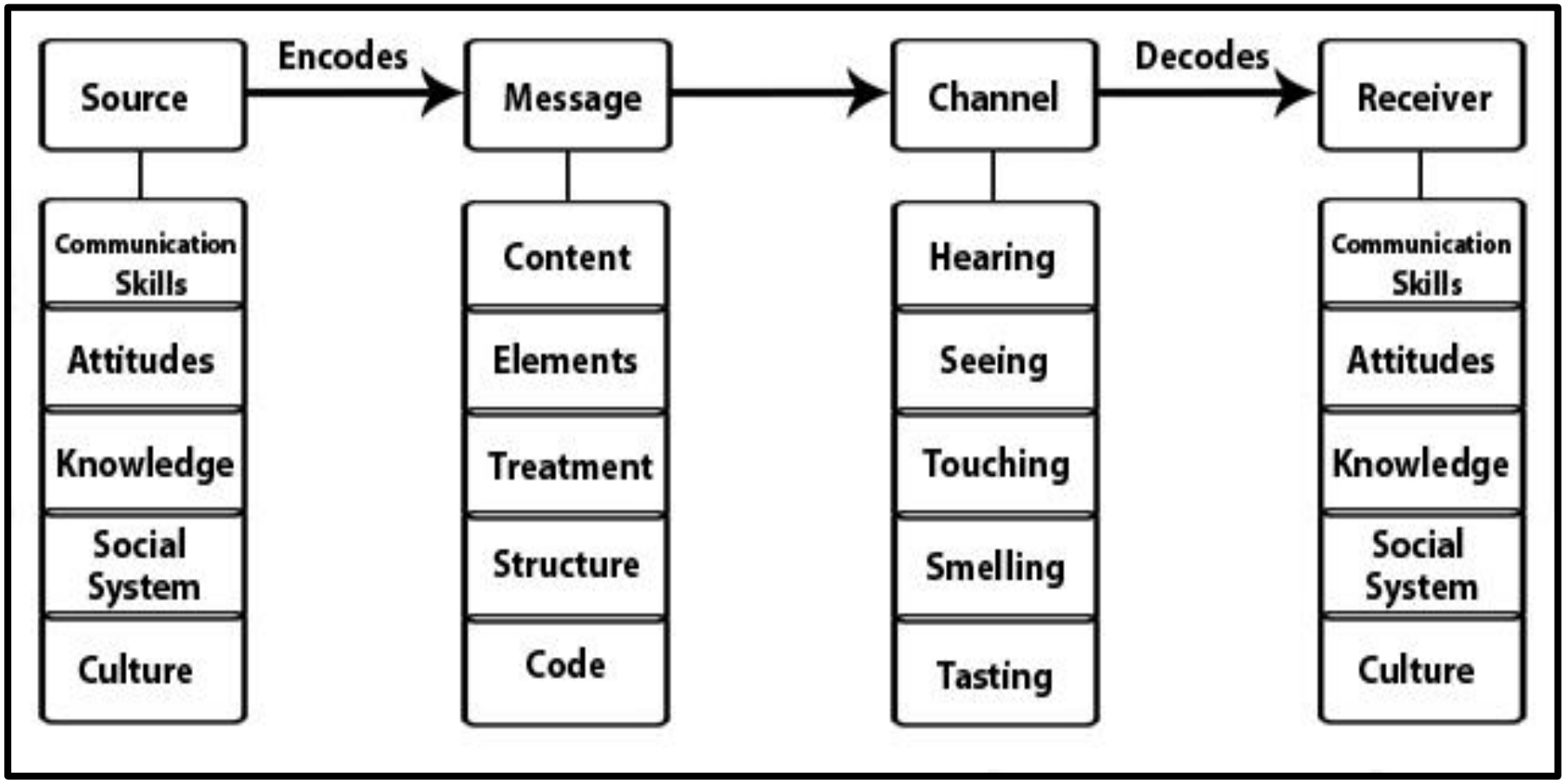

Figure 6: Source-Message-Channel-Receiver Model of Communication

Source. Communication Theory (2019).

Once the message is encoded, communication occurs through a channel and then is decoded by the receiver. This is a unilateral, liner model, similar to Shannon and Weaver's model, but in contrast, it does not address potential noise that may come in from outside the source (Communication Theory, 2019). Rather, the noise factors that could come into play are considered as the encoding of the message. For the purposes of this research to assess how the research is translated, this is an important distinction because it looks at the relevant factors of the message itself. Such factors could be, for example, the framing used by the journalist for opinion-shaping purposes, the political biases of the news media source, or the patterns of these techniques used across media reports, all of which should be considered when trying to empirically derive how the news media translates nutrition research. Understanding such potential tactics at the onset will allow the researcher to know what to look for during the case study.

Americans are "serial" news consumers (American Press Institute, 2018), meaning that they no longer consume news on just a daily basis but hourly. The news media has become a primary source for information, including nutrition information. As Frank Luntz (2008) famously said: "It's not what you say, it's how you say it." Consumers are looking for information in the news, but are they understanding it? Is it being portrayed or translated correctly? Framing is a concept in communication science that is "largely unspoken and unacknowledged" but is used to "organize the world both for journalists who report it and, in some important degree, for us who rely on their reports" (Gitlin, 1980, p. 7). Originally tied specifically to agenda setting, framing is now known to be a separate concept that defines how the characterization of a message can influence the way the message is understood (Scheufele & Tewksbury, 2007). This, of course, gives power to the message encoder. If the message is framed

in a confusing or misleading way or just incorrectly, it is possible that it will not be received as intended. In other words, the knowledge will not have been translated effectively due to poor framing. On the other hand, if the framing is done in a way that better elucidates a complexity that was uncovered by a scientist, then perhaps the framing assists the news consumer in understanding the message more succinctly and accurately. This means framing has the power to promote new scientific recommendations, correctly or erroneously, through promoting specific perceptions in specific ways (Entman, 1993; Scheufele, 1999). Further to this point, Price et al. (1995) define how framing (i.e., the presentation of news) can "systematically affect how recipients of news come to understand [the message]" (p. 4). Crucially, however, this does not mean journalists are actively trying to be deceptive in their writing. Instead, they are using this technique to enhance understanding. In fact, framing can be an excellent tool to present complex information in an accessible way (Gans, 1979; Scheufele & Tewskbury, 2007; Shoemaker & Reese, 1996). Framing, when done well, can lead to increased understanding and decreased confusion. If framed poorly, however, or if too much context is removed, the translation is inadequate and can lead to the adverse effects of increased confusion. For example, if a journalist reports on new research regarding eggs, it can be reported in the farmers' perspective, where farm-fresh quality is highlighted, and "big industry" is condemned for their factory approaches. Alternatively, it could be reported from the perspective of the company processing and packaging the eggs, highlighting the advantages of pasteurization and vitamin enrichment available from their company, and condemning food safety gaps of eggs fresh from the farm. If reported from an outsider's perspective, perhaps it highlights the pros and cons of farm fresh versus industry processed, leaving the reader to come to their own conclusions. At the end of the day, however, research has shown (and the DGA confirms) that eggs provide nutrition to

consumers whether they have chickens in their backyard or purchase eggs in the store. Using this example, it is easy to see how consumers reading these three hypothetical articles could come away with different views of eggs from each and how they may potentially be very confused about which eggs to choose. While framing is a helpful aspect for explaining a complex topic, it is critical that it is used in a way that still allows for translation of the correct underlying message.

Translational Science

Translational research focuses on closing the gap between the production of evidence and the implementation of those findings. As described by the University of Arkansas for Medical Sciences (UAMS) Translational Research Institute and shown in Figure 7, translational research is research that

- "Encourages and promotes multidisciplinary collaboration among laboratory and clinical researchers.
- Incorporates the desires of the general public, with communities being engaged to determine their needs for health innovation.
- Identifies and supports the adoption of best medical and health practices." (UAMS, 2022)

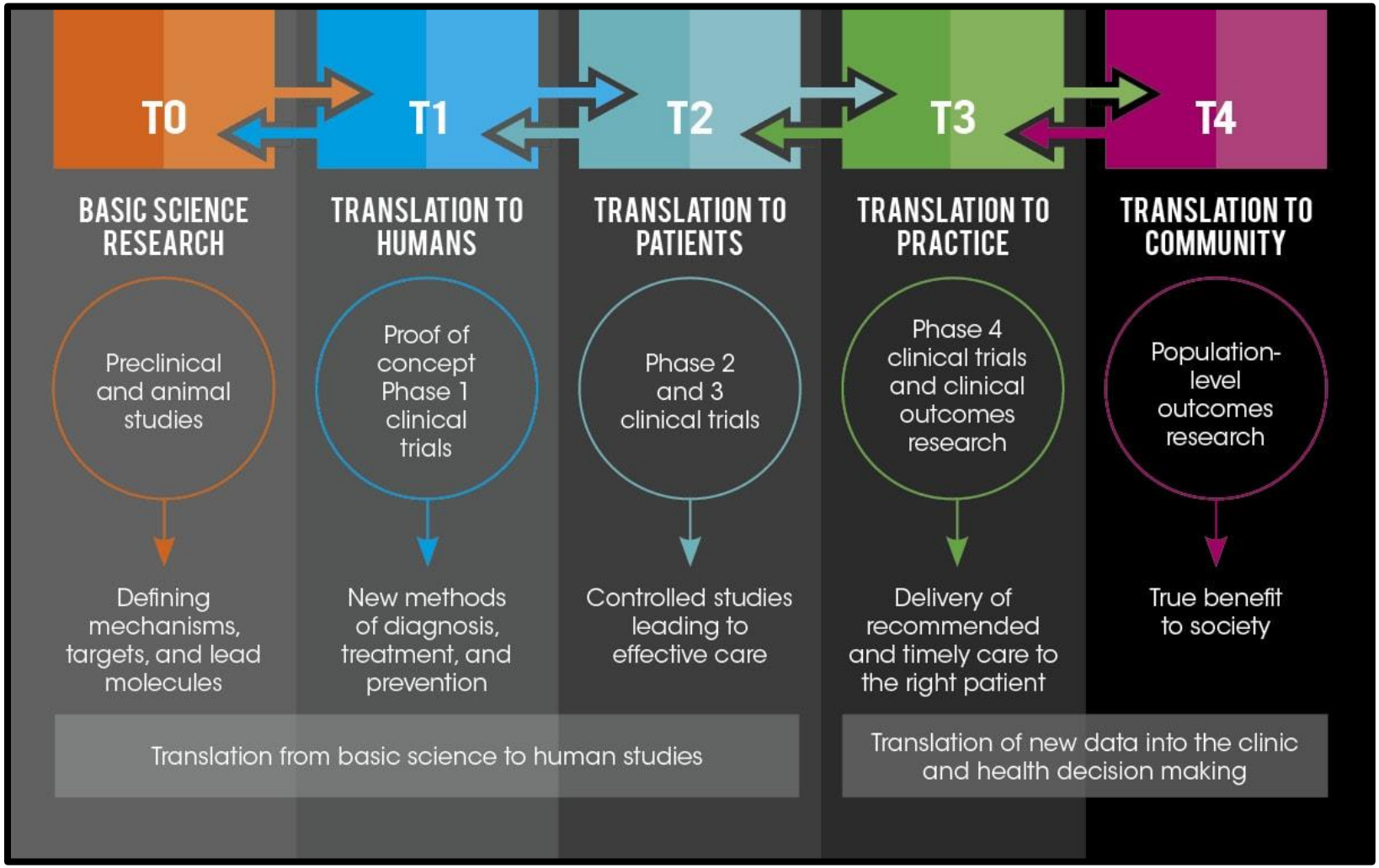

Figure 7: Translational Health Sciences Spectrum

Source. UAMS (2022).

When developing translational science, one goal should be turning observations into interventions that improve the health of individuals and the public (Austin, 2018). In this research study, the observations were abstracted and then retroduced from the data. Retroducing observations refers to the process of combining the data in unique ways until plausible mechanisms can become observed. The process of retroduction itself is to hypothesize mechanisms that can be observed from the data explaining the contexts and outcomes (Vincent & Wapshott, 2014). Retroductive reasoning (discussed in more detail below) is a useful approach to understanding the contextual and conditional factors that might shape translation. Thus, the findings from this study will suggest a focus for solutions that can be disseminated and will help future research test interventions to determine the best solutions that will fit into the context of the complexity of the real world. Therefore, this research is translational, with a key aim that will yield findings about the translation of nutrition research in a real-world setting (UAMS T3 in Figure 7) to ultimately make recommendations that will bridge the gap, moving closer to improved health nationwide (UAMS T4).

Types of Reasoning and Applications within the Dissertation

Reasoning within the Dissertation

To develop a scientific argument, or justification for an observed theory, one must employ reasoning. There are three key types of reasonings that may be employed based upon the type of theory, or conclusions, being developed: inductive reasoning, deductive reasoning, and retroductive reasoning. Below I explain each and the applications within this dissertation.

Inductive and Deductive Reasoning

Two of the more well-known types of research approaches include inductive and deductive reasoning. These two types of reasoning are the converse of each other. Inductive

reasoning involves a research approach that begins with data points, or observations, that are then pulled together to develop broad generalizations from the data. This can be thought of, for example, as growing answers out of data, or going from small to big. In contrast to inductive reasoning, deductive reasoning goes from big to small. Instead of drawing conclusions from the data as a starting point, deductive reasoning begins with an idea of the conclusion (i.e., starting with a hypothesis) and involves the process of examining the data to either validate or nullify a hypothesis.

Typically, inductive reasoning is associated with qualitative research, in which the researchers are exploring data to generate a theory (Neuman, 2003). Conversely, deductive reasoning is typically associated with quantitative research, in which researchers are deducing an answer from specific data based on the theory postulated at the beginning (Neuman, 2003). In this specific research, which is qualitative in nature, inductive reasoning is used in the abstraction phase, specifically during the thematic analysis process. The thematic analysis used in this study, allowed me to make observations from the data that I then organized into codes to build a broad theory about the events, as seen in the findings to Research Question 1 (see Chapter 4). This is inductive reasoning. Deductive reasoning was not used in this study.

Retroductive Reasoning

A third type of reasoning is retroductive reasoning. This dissertation uses, in large part, retroductive reasoning, which is a key type of reasoning used in critical realist studies. Retroductive reasoning, also known as retroduction, is a form of reasoning used to develop hypothesized mechanisms. Similar to inductive reasoning, the researcher builds theory from the observed data. Unlike inductive reasoning, however, retroductive reasoning is thought to be "more iterative and creative in nature as the researcher moves back and forth between the data

and the explanation" (Saxena, 2019, pg. 19). Retroduction is used to combine the data in unique ways until plausible mechanisms are observed and recorded. Per Danermark et. al. (2002) a key differentiator between retroductive reasoning and inductive reasoning is the "transfactual thinking" used during the retroduction process, which requires thinking beyond observations to postulate the mechanisms at play. Retroductive reasoning was used extensively in this research as detailed throughout the methodology in Chapter 3.

Conflicts of Interest

It is important to note that conflicts of interest are a critical consideration when it comes to science. A quick university library search using the terms "nutrition" AND "conflict of interest" returns more than 34,000 results with titles that range from straight forward ("Conflict of interest and the role of the food industry in nutrition research") to prescriptive ("A proposed approach to systematically identify and monitor the corporate political activity of the food industry with respect to public health using publicly available information") to demanding ("Conflict of interest in the training and practices of nutritionists: regulation is necessary"). When it comes to nutrition, it is important to consider potential conflicts of interest as they apply across the board. As John Kingdon (1984) explains in his seminal work on political agendas, "[P]articipants without formal government positions include interest groups, researchers, academics, consultants, media, parties and other election related actors, and the mass public." All players in each of these groups can, and do, lobby, take a side, or contribute to the interests of their own and other groups. Each has a vested interest in an outcome. When it comes to nutrition research, it can be easy to see a direct link between money and the food industry, but to assume there are not similar links for others focused on this space would be naive.

Conflicts of Interest: Interest Groups

Conflicts of interests are everywhere, and they need to be appropriately managed. Interest groups can be considered as those with a vested interest in an outcome. Interest groups are of critical concern, given that they have a particular stake in the subject area and, potentially, something to gain. In the nutrition space, the obvious example is the food industry, but public health organizations are also a part of this group that should not be forgotten. Nongovernment organizations (NGOs), advocacy groups, agricultural commodity groups, and research organizations, among others (as described by Kingdon, 1984), can also be included in this category. All of these groups employ lobbyists and have something to gain from nutrition research coming out in their favor.

To manage these interests, professional membership organizations are stepping up to develop tools for managing biases. Likewise, the World Health Organization has unveiled a new tool for managing conflicts of interest in research. There are myriad checks and balances for conflicts with federal advisory committees, based on U.S. Office of Government Ethics requirements as defined by the Ethics in Government Act of 1978. Based on work done by the National Academies of Sciences, Engineering, and Medicine (NASEM) before the 2020 DGA process began, there were recommendations that the selection process be "enhanced to optimize its integrity" (NASEM, 2017). Given this recommendation, the USDA and HHS developed a robust protocol for screening conflicts of interests for the DGAC. The 2020 DGAC was composed of 20 nutrition science experts, academic researchers, and medical doctors, based on factors publicly outlined when the request for nominations was announced. According to the NASEM recommendations, each expert was assessed for financial conflict of interest by the USDA Office of Ethics officials and went through formalized ethics training to serve on the

committee. More details of this robust review can be found on the publicly available website, DietaryGuidelines.gov.

The individuals chosen for the DGAC are prominent experts in the field of nutrition science that have been nominated by their peers in the field for their knowledge and scientific prowess. Self-nominations are also accepted.

The government cannot fund all research, and research requires substantial funding. Currently, multiple federal departments and agencies invest in nutrition science, with the U.S. National Institutes of Health and the USDA being the largest investors; however, these investments have "remained flat or declined over several decades" (Fleischhacker et al., 2020, p. 723). Therefore, the buying power of the funding has decreased due to inflation even in the best-case scenario. To expand the scientific evidence base, the United States needs more research funding from government, external organizations, or both. Therefore, interest groups play a critical role in the funding of nutrition research, which is then carried out by researchers and academics. Research funded by interest groups should not be presumed to be inherently flawed based on the research funding, no matter the interest group. It should, however, be presumed that the academics conducting the research have a high moral compass and propensity to carry out research with integrity, no matter the source of funding. While this is, unfortunately, not always the case, the U.S. traditionally employs a presumption of innocence until proven guilty approach to law that can be useful in these scenarios as well. Potential conflicts of interest should be declared transparently. Critical thinking should always be employed by the reader, and conflict mitigation plans should be explained by the researchers. When it comes to translation, these items should be provided so that recipients of the knowledge translation can employ their own critical thinking skills as well. One solution that is being discussed by policy makers is a new

coordinated federal research effort and authority (Fleischhacker et al., 2020). Until we have a national funding source large enough to adequately move the nutrition science forward, it is inevitable that these financial conflicts will exist. Therefore, in a group of nutrition science experts, it is unlikely that any would not have worked on research funded by interest groups throughout their distinguished careers. Conflicts of interest can and should be managed appropriately (i.e., mitigation plans, transparent declaration of potential conflicts and funding sources, etc.) during the design and implementation of the research. They should also be managed in the review of the research, including both peer review before publishing and general review by researchers whose work will build upon it as an evidence base. Further, in addition to managing the potential conflicts of interest via ethical reviews of the DGAC and rigorous reviews of the evidence base, the DGA law takes one additional step in management: using the "preponderance of evidence" evidentiary standard. A definition of this standard is "the burden of proof is met when the party with the burden convinces the fact finder that there is a greater than 50% chance that the claim is true" (Cornell University Legal Information Institute, n.d.). In practice, this means the expert opinions, while important, cannot overpower the evidence itself when it comes to the development of the final DGA. The experts play a critical role in reviewing the science and making their recommendations, which is an extensive and important part of the process, but the ultimate document should, by law, follow the scientific evidence itself. There have been differing views on whether this has always been the case, leading to multiple calls for the NASEM to review the DGA development processes. Calls for review occurred after the 2015 and 2020 DGA releases, due to concerns that the preponderance of evidence standard was not properly followed.

Conflicts of Interest: Media

The media has a large role to play in educating the public. In our current social and political climate, U.S. consumers are more divided than ever. The significant polarity in the American public is something that the news media is dealing with, catering to, avoiding, or covering from a journalistic standpoint. There is also an "infodemic" of fake news and cyberattacks (Gersema, 2021). This can lead to a degraded level of trust in the media. In a report from the Pew Research Center (2022), expert Lee Raine stated: "Our work shows that people are less trustful of major institutions, including the news media, than they used to be." There are several issues that contribute to this. The University of Southern California (USC) Annenberg School for Communication and Journalism has been working to better understand the amount of division in the United States overall. Specifically, USC researchers are working to understand and develop recommendations to counter this current social and political polarization and misinformation in the news and its contribution to this issue (Gersema, 2021). Thus, they developed an innovative tool called the USC Polarization Index, as shown in Figure 8: "The Polarization Index (PI) is the first data science-based measure of the overall degree of polarization in America, as well as the level of polarization across ten key issues" (Polarization Index, 2022).

Figure 8: The Polarization Index (Current as of June 2022)

Source. Polarization Index (2022).

These issues do not have an overly direct link to nutrition science, with climate change having the closest link. To note, climate change and sustainability are not a part of the DGA mission. While there have been calls to add this to the mission, this work has been deemed out of scope for the DGA work for the past two editions by the Secretaries of Agriculture. Further, it was just recently (April 2022) deemed out of scope for the upcoming DGA, 2025-2030 work, which is in the earliest stages of beginning. But the state of polarization is impacting both the trust in the media and the media's revenue streams.

As documented by the Pew Research Center, newspaper subscriptions have seen massive decline over the past decades, peaking in the 1990s and steadily diminishing year over year. The movement of media from the traditional print to the digital spaces in which it is found today has been a huge disruption to this industry (Shearer, 2021). With the advent of the internet, many subscriptions moved to digital format, as well. Gauging digital circulation poses challenges. The recent research estimates that digital subscriptions have risen, but "the estimated total U.S. daily newspaper circulation (print and digital combined) in 2020 was still down 6% from the previous year" (Pew Research Center, 2021). Advertising is also a critical source of revenue for the media business, as the "total estimated advertising revenue for the newspaper industry in 2020 was $9.6 billion" (Pew Research Center, 2021). Again, this number is in decline, year over year. Given the plethora of ad space online, digital ads cost less. To make the same revenue, companies thus need to sell more ads and create more content. To find money in this gap, some newer sources of news have begun to test business models such as paying writers per click. This could bring to the forefront major concerns around conflict of interests. As noted in the *Columbia Journalism Review*, "detractors claim [these type of business models have], at times, failed journalism and its practitioners" (Murtha, 2015).

Inferences for Forthcoming Study

Literature Gaps That Need Addressing

Recent expert opinion suggests that there is a problem with headlines and effective translation of nutrition research. Further, two studies report that nutrition research in the media leads to both nutrition confusion and nutrition backlash in the United States (Clark et al., 2019; Lee et al., 2018). However, the actual content, context, and reporting of nutrition research is widely understudied, providing a gap in the research to be qualitatively reviewed. A comprehensive literature review found only two studies (both of British media, none within the United States) looking at this line of inquiry. This study will attempt to address this gap by exploring how the news media translates published, peer-reviewed nutrition research and why these outcomes are found. This study is also translational, closing the gap between the production of evidence and the implementation of those findings by recommending causal mechanisms from this case that could be further developed and tested through future implementation research.

The Research Paradigm

This study combines ontological realism with epistemological relativism using a critical realism lens. This paradigm fits the overarching goal of this work—to develop a deeper understanding of what is happening in the real world by looking first at what is happening and then theorizing the *why* from analysis of the outcomes and context. With critical realism, I can understand that the mechanism and the context create the outcome, but as in the case of this

research, I do not know the mechanisms. I can use the data sources compiled for this research to look for possible mechanisms and build a theory to be tested in future research. The key focus of this approach is on evaluating the data and explaining what is going on, using the lens of a critical scholar.

Critical realism combines realism and subjectivism and is focused on explaining how and why something occurred. It provides this explanation via postulation of the mechanisms, which are the hidden causal forces behind how or why something occurred. In this study, critical realist methodologies were used to create a theory about the context and causal mechanisms that came together to generate an observable event. Importantly, the emphasis is on explanation of *how* and *why* these events occurred and were experienced in such a way, as to be determined through the research. Scholars who use critical realism understand that the world and events within it are complex, and the integration of the logical and contextual is necessary to inform research.

Critical realism, unlike some other paradigms, focuses on understanding the *how* and *why* of reality. It does this with a stratified view of reality. This stratified, or multilevel, view of the world used by critical realists offers the ability to look at multiple perspectives and does justice to the complexity of problems occurring in the real world. For example, events occur, and events are experienced—and the experience of the events may be perceptions that are not exactly as the event occurred. A critical realist view of the world looks at these two levels of reality separately to understand each individually. It can then explore the mechanisms that created the differences between the event as it occurred and the event as it was experienced. This stratified view of reality in critical realism includes exploration of three domains: Empirical (the view of the event as experienced), Actual (the view of the event as it occurred), and Real (the mechanisms that caused the events as experienced to be the same, or different, as the event as it occurred). These

domains can also be looked at in another way. O'Mahoney and Vincent (2014) view them as **the contexts + the mechanisms = the outcomes**. This work builds upon Pawson and Tilly's (1997) critical realist evaluation structure, in which the researchers discuss use of a context-mechanism-outcome configuration (CMOC) nomenclature. Importantly, critical realism can be a challenge to understand due to the different nomenclature used. These domains and the various nomenclature options can be seen in Figure 9.

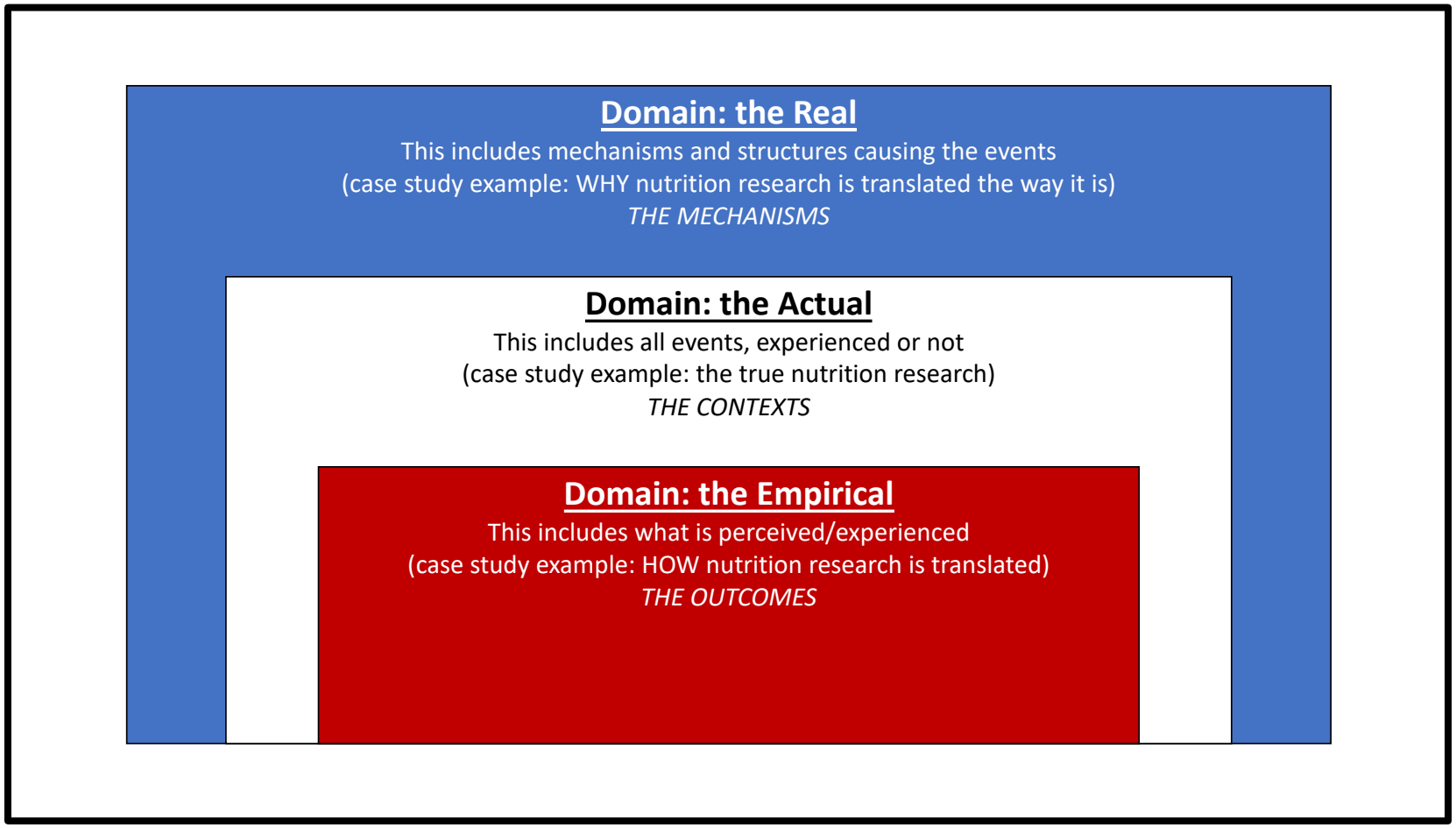

Figure 9: Graphic Depiction of the Three Domains of Critical Realism, With Case Examples

A critical realism approach evaluates how an event was perceived compared to the event as it actually occurred to ultimately form a theory of the mechanism(s), or more explicitly, why it was perceived in such a way. As viewed in Figure 9, the Empirical Domain is what we perceive or experience; what is experienced can also be considered the outcomes. In this study, the published popular press articles are what we will view within the Empirical Domain. How the published popular press articles were translated in relationship to the event that occurred (the release of the DGA, 2020-2025) provides the view of how that event was experienced (the outcomes). The Actual Domain is what is actually happening (not necessarily what was experienced); what actually happened can also be considered the context for the event. The Actual Domain in this study is the underlying nutrition research, specifically the DGA, 2020-2025. Third, the Real Domain is where we find the mechanisms and structures causing the events to be perceived in such a way that is either similar to or different from the actual event as it occurred. Taking all three domains into account allows a multilevel, or stratified, view of what happened, which enhances the ability to assess each perspective separately and then together.

Using the CMOC nomenclature, simply put: **the contexts + the mechanisms = the outcomes**. As we learned in American high school algebra, if you know (or can discover) two of the variables, you can discover the third: x + y = z. In this case, I know the context. The context (the y), the event as it occurred, is the release of the DGA, 2020-2025. I know the content of the guidelines; I have the document and can abstract what is written within them. I do not know the y (the mechanisms) or the z (the outcomes). This is what the exploration of the empirical evidence via the methodology proposed will tell me. Now that it has been robustly explained using the various nomenclature options, the remainder of this study will use the CMOC language throughout for ease of understanding.

Originally, critical realism was described as a paradigm without specific methodology, but more modern research has provided methodological principles for use of critical realist ontology and epistemology and, specifically, for use with a qualitative case study methodology. As defined by Wynn and Williams (2012), these principles include abstraction, retroduction, and empirical corroboration. While these will be defined explicitly in the procedures section, in short, these principles can be defined as follows:

- **Abstraction:** Abstraction is the process of describing the data and observations within the data, specifically the data regarding the events (as occurred and as perceived, also known as the context and outcomes, respectively). In this project, I used the communications framework developed by Berlo (1960) to determine the most critical pieces of information to abstract.
- **Retroduction:** Retroduction is a form of reasoning used to hypothesize mechanisms that can be observed from the data explaining the events (as occurred and as perceived, also known as the context and outcomes, respectively) (Vincent & Wapshott, 2014). In this project, I used retroductive reasoning to combine the data in unique ways until plausible mechanisms were observed and recorded.
- **Empirical Corroboration:** Empirical corroboration uses the outcomes (the data in the domain of the empirical) to review the hypotheses as retroduced and ensure adequate causal/explanatory power of the hypotheses (Hu, 2018). Empirical corroboration is a method of triangulating the data, ultimately impacting the trustworthiness of the study.

These principles are iterative and layered into the overall methodological philosophy as described in the procedures section. The overall methodological approach is depicted in Figure 10.

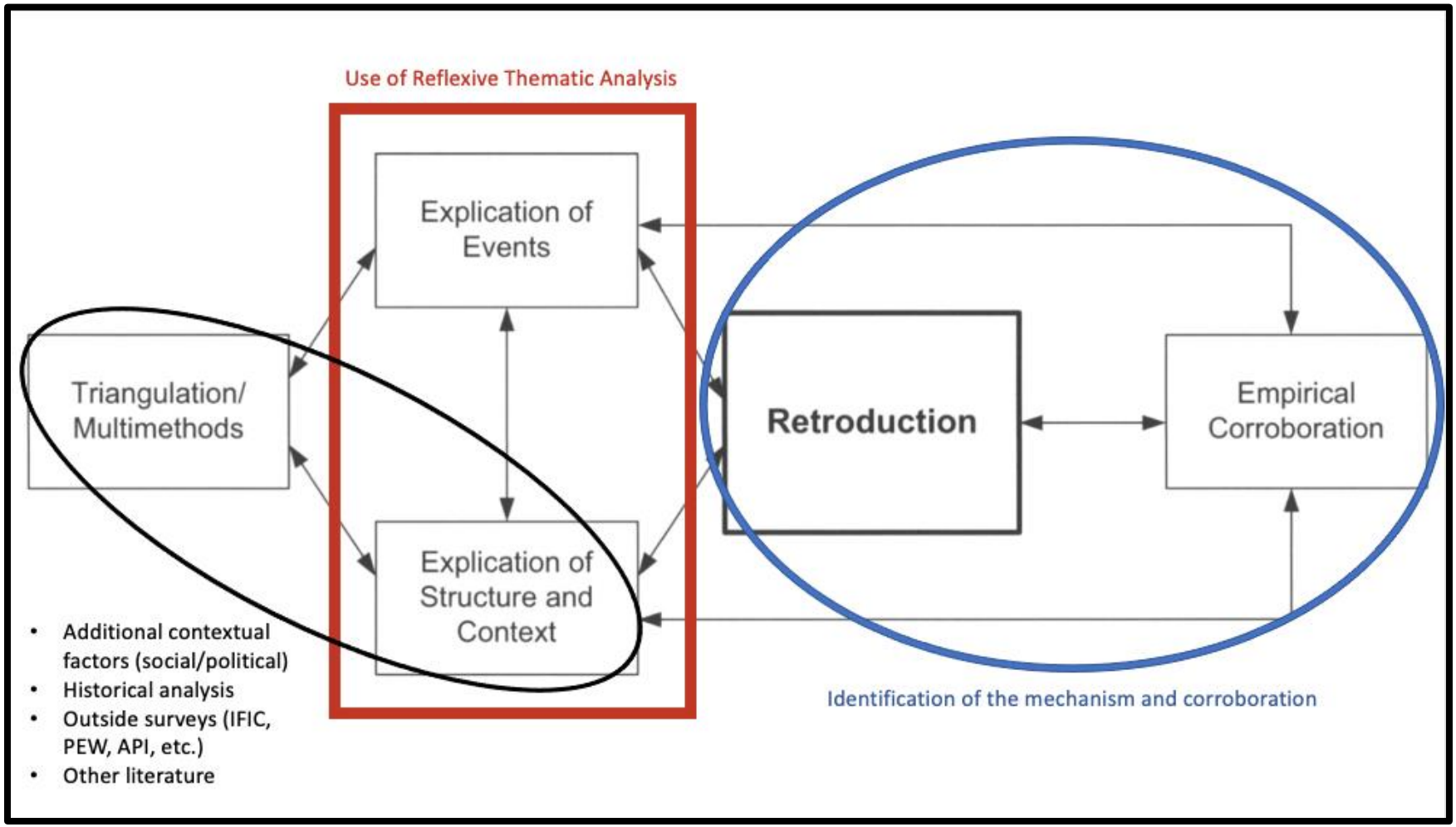

Figure 10: Graphic Depiction of Critical Realism Methodology

Conceptual Framework

The use of critical realism, as discussed above, provided a lens and overall methodology for this research; the conceptual framework outlined below was used to define the problem, which consists of several key variables, and to ensure that the research is translational. As shown in Figure 11, the conceptual framework for this dissertation combines the KTA framework by Graham et al. (2006) and the SMCR model of communication by Berlo (1960). KTA is a key framework in translational health sciences, as it provides steps for moving knowledge into action. For the purpose of this study, KTA is used to conceptualize the stepwise approach this study will use to add to the literature on nutrition confusion. Recent expert opinion suggests that there is a problem with headlines and effective translation of nutrition research. While two studies report that nutrition research in the media leads to both nutrition confusion and nutrition backlash in the United States (Clark et al., 2019; Lee et al., 2018), this is a widely understudied phenomenon that this research begins to address. By following the KTA approach, I am defining two research questions:

1. How does the news media translate nutrition research?
2. What are the mechanisms that contribute to the translation of nutrition research in the news media?

The first is the knowledge synthesis question, effectively happening in the knowledge funnel as seen in Figure 11. The SMCR model is used within this knowledge creation funnel to help guide the research in a systematic way. This research is specifically driving inquiry into the message of the news media and how that message is being translated from the source. In Research Question 1, this research generates knowledge about how research is translated, using the SMCR as a guide. In Research Question 2, this research steps out of the knowledge

generation funnel and into the action cycle, the first steps of which are assessing the contexts. In Research Question 2, I am looking at the local contexts, the source of the nutrition research message, the news media, and potential mechanisms that affect the *how* that was determined via Research Question 1. Both are included in the study conceptual framework to address what knowledge is being translated in media reports and how that knowledge is being communicated. Each is defined in more detail below.

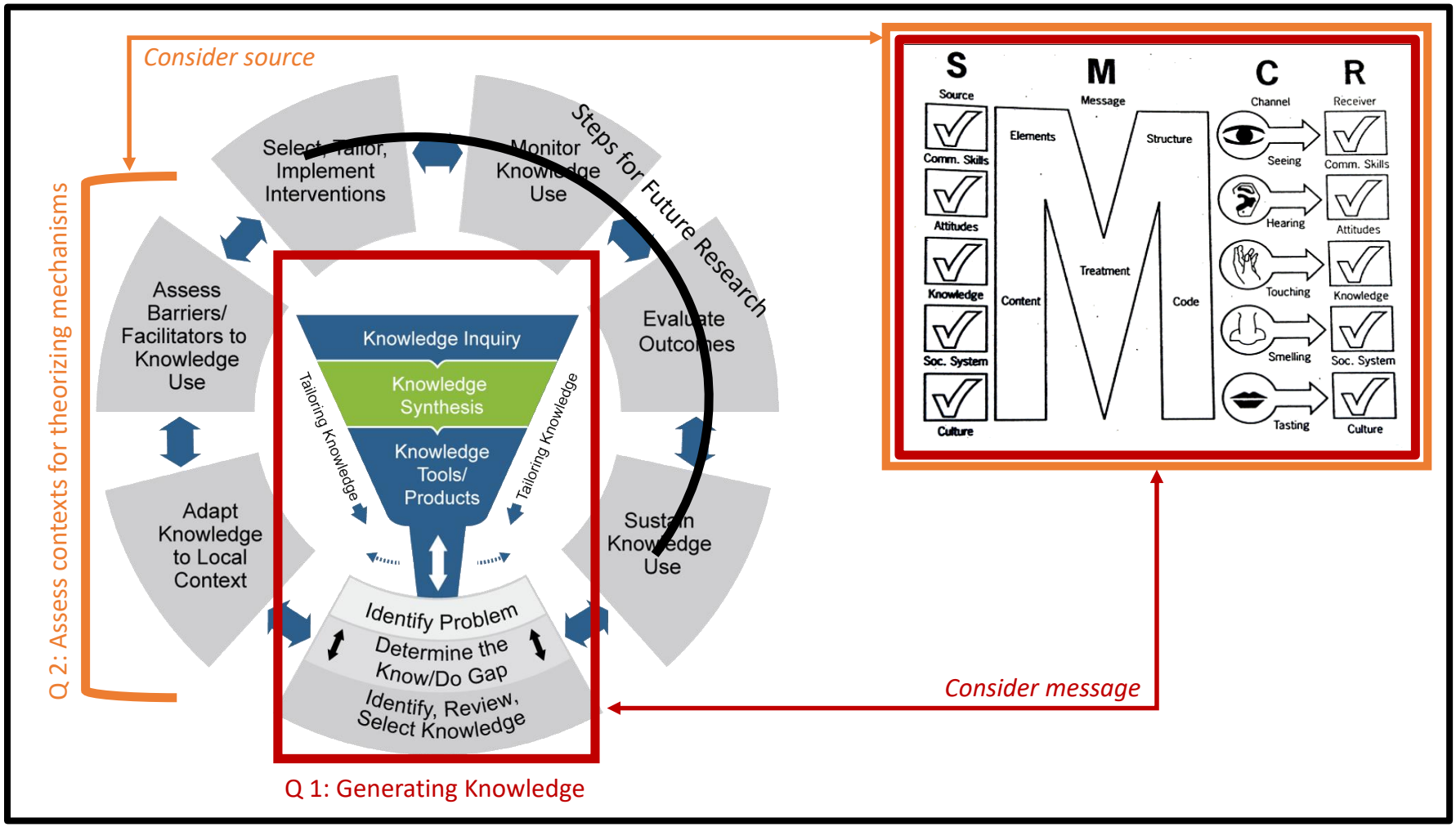

Figure 11: Graphic Depiction of the Conceptual Framework

Berlo's SMCR model of communication was laid within the knowledge creation funnel, specifically looking at the elements that make up the model when performing the thematic analysis. This provided an outline of elements to explore within the messages to facilitate assessments of how the research was being messaged to receivers (i.e., American consumers). Berlo's model helped shape the thematic analysis that took place in the knowledge creation funnel of the KTA framework. For this research, the event will be explored using generation of themes from the message, which is the critical piece of the Berlo SMCR model that this study is considering. The message is made up of five concepts: content, elements, code, treatment, and structure. In addition, the Berlo model was used outside the knowledge funnel during the first steps of the action cycle. This assisted in outlining items that need assessment when looking at the contextual factors—specifically, the source elements of the model. Together, this model and framework provided boundaries for the entire research project.

The KTA framework developed by Graham et al. (2006) was used when building out the conceptual framework for this research. The knowledge creation funnel, at the center of the framework, could be considered a depiction of this research. The KTA then takes that created knowledge and pushes it into action via the action cycle, which helps not only ensure uptake of the knowledge created but also that future research can assess, monitor, and evaluate change. It also allows for adaptation (as needed) to lead toward a greater chance of sustained knowledge use. This tool can be used on its own or integrated with other tools. The KTA framework is a step-by-step, iterative, and cyclical process. In the center is the knowledge creation funnel. It includes inquiry, synthesis of the findings, and development of products or findings. Following knowledge creation, the knowledge is put into action in the action cycle. This includes application of the findings, with adaptation, as needed. Similar to critical realism, assessing

contexts is a critical part of the KTA framework. The action cycle continues with testing the findings and evaluating the outcomes to sustain knowledge use, which in this case remain areas for future research (i.e., next steps after the dissertation). Moving knowledge into action is supported using program theory. Program theory is composed of a Theory of Change and a Theory of Action. Each of these two components of program theory benefits from an understanding of the relationships among context, mechanisms, and outcomes described in this study. Specifically, an outcomes chain is used to clarify the intended outcomes of the innovation and connects each with related contextual factors and mechanisms. Intended outcomes address the translation process or end results, and they often visually illustrate how each outcome contributes to solving the larger complex problem (nutrition confusion, in this case). Once the outcomes chain is developed, a researcher can move into developing a Theory of Action, which helps further define the success criteria, what inputs and outputs are needed, what program and nonprogram factors need to be controlled, and what resources and activities are required to achieve success. Developing the Theory of Change and Theory of Action could be integrated into the KTA cycle, strategizing the plans, developing the logic models, and considering intended outcomes, then moving into the KTA funnel of knowledge creation, and, finally, pushing that knowledge through the action cycle.

CHAPTER 3: METHODOLOGY

Methodology Overview

Research Goals

The goals of this research were to develop a detailed case study of the release of the DGA, which is prominent, peer-reviewed, published nutrition research. This study took a critical realist approach to review the related print news media published on the day of release (December 29, 2020) compared to the published DGA, to explain how nutrition research was translated to the general public. The key research questions for this case study are as follows:

1. How does the news media translate nutrition research?
2. What are the mechanisms that contribute to the translation of nutrition research in the news media?

In this research, since both the outcomes and the mechanism(s) were unknown at the start, this is the focus of Research Questions 1 and 2, respectively. Research Question 1 asks how the event was perceived, by exploring and describing the outcomes (the z) and comparing them to the context upon which they are based (the event, or the x) in a critical way. If **x + y = z**, then **z – x = y**. Research Question 2 asks why it was perceived in such a way: what was the mechanism that caused this perception? This research question is answered by using the comparisons between x and z—the contexts and the outcomes, respectively—to retroduce mechanisms of action, which provides us the y. Therefore, I am looking at the outcomes (z) compared to the contexts (x) to generate the mechanisms (y).

The outcomes, the articles published, were explored and explained through detailed content analysis, specifically using RTA. A qualitative approach was used in this study, since the goal was to understand how and why (the mechanism) the news media translated nutrition research that was disseminated in the popular press. Taking all of these factors into account, the most ideal form for this research was a case study design (O'Mahoney & Vincent, 2014). This research provides a retroactive review of the case, as the release of the DGA and the popular press articles all occurred on December 29, 2020. This exploration will allow for educated postulation of the mechanism(s) that caused the outcomes, which can be translated back to professionals and researchers for testing, further inquiry, and eventually policymaking (as needed).

Specifics of the Methods

Research Questions

As discussed, this case study reviews how the digital print news media immediately translated the concepts of the DGA, 2020-2025 to the American public. This exploration was used to understand how the news media translates research and what could cause this outcome. The research questions for this case study are as follows:

1. How does the news media translate nutrition research?
2. What are the mechanisms that contribute to the translation of nutrition research in the news media?

I must first find the outcomes by exploring how the nutrition research was translated and compare it to the original contexts (the actual DGA as released), answering Research Question 1, to ultimately uncover the mechanisms that lead to this type of translation (good or bad), answering Research Question 2.

Selecting Sources

For this case study, the main text of peer-reviewed, published nutrition research was the DGA, 2020-2025. In the critical realist perspective, this represents the context within which I evaluate the outcomes, which were the articles printed in the popular press. Whether this event was experienced as it actually occurred or was experienced differently than it occurred will be determined by evaluation of the sampling of digital print popular press news articles (i.e., assessment of the outcomes).

To assess the outcomes, I used a convenience sampling of articles published on the day of the DGA release (December 29, 2020). These sources were found via a USDA compilation of "top clips" and additional searches on Google until saturation was reached. The sample was exclusively digital versions of the articles because 86% of U.S. adults get their news from a digital device (Shearer, 2021). Inclusion and exclusion criteria for compiling this convenience sample included the following:

1. Printed December 29, 2020 (day of DGA release)
2. Main topic: The Dietary Guidelines for Americans, 2020-2025
3. Not a reprint of another article
4. Main news media source (not a promoted blog, for example)
5. Not an opinion piece

The search resulted in 25 articles, all published on December 29, 2020. Five reprints were removed: four of Johnson (2020) and one of Thompson (2020). The final sample of 20 articles included the following:

1. Petersen, A. (2020). New U.S. dietary guidelines reject recommendation to cut sugar, alcohol intake. *Wall Street Journal*.

2. Johnson, C. K. (2020). New US dietary guidelines: No candy, cake for kids under 2. *Associated Press*.
3. Leonard, K. (2020). 5 ways the US government just changed its recommendations for what you should (and shouldn’t) be eating. *Business Insider*.
4. Bottemiller Evich, H. (2020). Trump administration rejects stricter advice on alcohol, added sugars. *Politico*.
5. Hirtzer, M. (2020). Trump administration keeps dietary guidelines on sugar, alcohol. *Bloomberg*.
6. Kelley, A. (2020). US government rejects scientific advisors' recommendations on alcohol and sugar consumption. *The Hill*.
7. Breen, K. (2020). USDA releases new dietary guidelines: What do they mean for you? *Today.com*.
8. Landsverk, G. (2020). The meat industry rails against new dietary guidelines for only mentioning 'beef' 5 times as the US promotes plant-based protein. *Insider*.
9. Strickland, A. (2020). New US dietary guidelines don't reduce sugar and alcohol intake. *CNN.com*.
10. Associated Press. (2020a). 2020-2025 Dietary Guidelines for Americans recommend grains at all life stages, maintains existing serving size for whole and enriched grains.
11. Associated Press. (2020b). Physicians committee faults new dietary guidelines for racial bias, calls for guidelines to be redrafted.
12. Associated Press. (2020c). Dietary guidelines reinforce dairy’s role in healthy dietary pattern.
13. Toaspern, J. (2020). Make every bite count with potatoes. *PR Newswire*.

14. Associated Press. (2020d). Gerber® applauds inclusion of birth to 24 month recommendations in the 2020-2025 Dietary Guidelines for Americans.
15. Camero, K. (2020). Experts ‘disappointed’ over new US diet guidelines on sugar, alcohol intake limits. *Miami Herald.*
16. Rabin, R. C. (2020). U.S. diet guidelines sidestep scientific advice to cut sugar and alcohol. *New York Times*.
17. American Egg Board. (2020). New Dietary Guidelines for Americans recommend eggs for the nutrition babies need for brain development. *PR Newswire*.
18. Thompson, D. (2020). New Dietary Guidelines for Americans ignore recommendations on sugar, alcohol. *US News and World Report*.
19. Poinski, M. (2020). Dietary guidelines published without changes to added sugars or alcohol recommendations. *FOODDIVE*.
20. Chase, C. (2020). USDA, HHS reject sugar, alcohol cuts in updated dietary guidelines. *AgriPulse*.

Procedures for Data Collection and Analysis

As described in Chapter 2, the research paradigm provides a stratified look at reality (Empirical, Actual, and Real domains) that can be studied using a more simplistic approach focused on CMOC, **the contexts + the mechanisms = the outcomes**. Exploring the context and outcomes using critical realism (Research Question 1) allows the researcher to postulate clear, concise, and empirically derived mechanisms that lead to how nutrition information is published in the popular press (Research Question 2). This dissertation used methodological principles derived directly from critical realism. These steps included the following:

- Steps 1 and 2: Abstraction of Outcomes and Context

- Step 3: Retroduction
- Step 4: Empirical corroboration

All steps included appropriate use of triangulation to enhance trustworthiness. Of note, empirical corroboration itself is a method of triangulation. These steps were initially defined in Chapter 2 and are explained in detail in the following subsections in the order outlined above. Importantly, these methods were done both stepwise, but also iteratively. For example, abstraction was done first, as it was the key method for answering Research Question 1, defining the *how* of the outcomes explicitly: How does the news media translate nutrition research? The answer to Research Question 1 was required to answer Research Question 2, which asks *why* these were the outcomes explicitly: What mechanisms cause nutrition research to be translated in this way? Retroduction is the key method for Research Question 2. However, abstraction was also used simultaneously with retroduction (as needed), because I returned to the original data for additional information about the context and outcomes necessary to develop hypothesis in Research Question 2. Triangulation was used throughout because it is an important method for enhancing trustworthiness. Empirical corroboration was done after answering Research Question 2, to corroborate the hypothesized mechanism, which lead to another iteration of abstraction, retroduction, and triangulation to ultimately refine and enhance the results. This will all be extensively explained throughout Chapter 4, with the findings of the research questions. I have structured Chapter 3 to provide an overview and give the reader the ability to level-set on the methodology. Therefore, Chapter 3 provides an initial high-level overview of the procedures used for data analysis (described stepwise below), and Chapter 4 provides a detailed narrative of case study outcomes, compares the outcomes to the context, and synthesizes the data to postulate mechanisms associated with how nutrition research was translated to American consumers in the

print news media. The findings will allow researchers to make the connection to how these outcomes may ultimately effect nutrition confusion, the key literature gap I am looking to fill with this case study.

Critical Realism Steps 1 and 2: Abstraction of Outcomes and Context

Abstraction is the process of describing what is observed. In this project, I needed to explain both the outcomes and the context. Berlo's model, the message specifically, provided a framework of what to explore in this case that would allow us to answer Research Question 1: How does the news media translate nutrition research? Figure 12 provides operational definitions adapted from the message aspect of Berlo's model that was used to guide the research process.

content	code	elements	treatment	structure
what the message is, start to finish, **e.g.:** • Main topic • Multiple topics or one focus • Concepts discussed • Broad or focused • Detailed or vague	**how / in what form the message is delivered** **ALL:** Digital Print	**what accompanies the content,** **e.g.:** • Quotes • Expert opinion • References provided • Links to references • Accompanying video content • Graphs, charts, images • Additional articles suggested • Ads	**how it is conveyed,** **e.g.:** • Positive language • Negative language • Neutral language • Feelings evoked by reading	**how it is arranged,** **e.g.:** • If debate, is it one side followed by the other or both sides provided • Sub-headings • One topic or multiple • If multiple topics, is there a logical order to the presentation

Figure 12: Considerations for Analyzing the Message

Source. Adapted from Berlo (2016).

A formal process of RTA was used to abstract the key themes from the outcomes. This provided abstraction of the content (one of the five considerations of the message aspect of Berlo's model). The process and procedures of RTA are described in the next section, denoted as Step 1a. I conducted RTA (as described step by step next) and generated themes for the newspaper articles (the outcomes). I then compared these themes to the DGA themselves (the context within which the outcomes were produced). I also abstracted additional information related to the other four considerations from the message from Berlo's model: the elements, the structure, the treatment, and the code. I conducted this abstraction iteratively and throughout the RTA, with margin notes and additional memoing. Key information was transferred to an Excel spreadsheet for generating the findings, which are presented in Chapter 4. The elements, content, treatment, structure, and code of the message in the outcomes were compared to the context itself. This comparison was used in the "telling of the story" to answer Research Question 1, which gave us information on *how* the news media translates nutrition research. As stated, Berlo's model assisted in defining the key elements to review/abstract during the exploration. Specifically key for this inquiry was the message, as described above. Using this framework allowed the research to be explored in a consistent way and identify which elements were key for abstraction. Overall, abstraction of the outcomes and context provided the two critical pieces of the ultimate three-piece puzzle (uncovering the outcomes and the contexts to ultimately postulate the mechanisms).

Critical Realism Step 1a: Reflexive Thematic Analysis

As explained above, RTA was used to specifically explore the content of the outcomes. This method was defined by Braun and Clarke (2006) to be a flexible approach used to explore different perspectives by building themes from codes. Using this method provided additional

structure to the abstraction and analysis of the content portion of Berlo's model. As Braun and Clarke (2006) describe, this approach allows for one coder to perform the coding and theme generation and does not use a pregenerated code book, as the code boundaries can be redrawn and clustered in multiple ways to produce the themes. The ultimate goal is to keep the analysis flexible and iterative, using the following steps.

RTA Step 1: Exploring the Data

The first step is to read through all the data, reviewing with a critical eye and memoing thoughts and considerations from initial review of the data to become familiar with them. It is important to observe any potential assumptions being made during the familiarization with the data, noting any ideas about potential forthcoming codes. I started by printing a copy of each of the 20 news articles selected for this study. I then read through each document, annotating throughout, highlighting, and adding margin notes. The goal was to familiarize myself with the materials. I also printed and fully read the DGA to familiarize myself with the context from which these outcomes came.

RTA Step 2: Coding Data Codes

This step can be thought of as labeling using sentences rather than single word codes. It is key that this step remains flexible, and that the researcher continues to adapt the codes; they can change as the data become clearer, and memoing should be continued throughout the process. This step was followed in an iterative fashion with the other steps. This analytic step reflects the constant comparison analysis method, as defined in the *APA Dictionary of Psychology* (American Psychological Association, 2022). Doing so allowed me to see that some codes could be further condensed and helped me to clearly identify patterns in the data. In essence, and as described above, it is a method of taking raw data and organizing it into different patterns, or

codes, to find the answer or generate a new theory (Glaser & Strauss, 1967). Once I had reviewed everything at least once, I started rereviewing the outcomes (the news articles) with a more critical eye to pull out the key themes of content. I reread each news article at least once, but I read many more than once (especially the longer ones); I highlighted key themes to become the initial codes for each article, and I transferred each original code into an Excel spreadsheet.

RTA Step 3: Identifying Themes

Themes are produced by developing clusters of the codes. The codes can be combined in different ways to map out how they may best fit together. This should work in a "puzzle-like" manner, using the codes and looking for the bigger, overarching concepts and patterns. Specifically, I systematically reviewed all codes to condense and generate key themes, which took two iterations. Once I had the final codes, I color coded them to enable viewing what stood out most. I printed this document to provide an overarching view of the materials. This step reflects use of theoretical sampling to identify the most salient patterns as themes that were then analyzed using a constant comparison method.

After identifying key themes from the data, they were corroborated and refined using the underlying data (not just the codes). Theoretical sampling ensures that the themes being produced continue to represent the entirety of the data and are pulling out the central organizing concepts. In other words, I used the codes to identify themes, and I then reviewed the entire dataset again in relation to each identified theme to ensure accuracy and to centralize around key themes compared to more ancillary themes. Some themes were further refined, as explained in detail in Chapter 4.

RTA Step 4: Telling the Story

Once themes were generated from the newspaper articles (the outcomes), they were compared to the DGA (the context) to describe how the news media translates nutrition research. As described in Chapter 4, this was done narratively and through the use of many vivid descriptions and examples.

By pulling these four steps together and applying them specifically to this study, I can identify the outcomes and compare them to the context. This comparison work answers Research Question 1 ("How does the news media translate nutrition research?"). By using RTA within a critical realism lens, I am determining the outcomes and comparing them to the context to understand how this translation occurs.

Critical Realism Step 3: Retroduction

Retroduction was the third piece of the puzzle, allowing for discovery of the mechanisms. Retroduction is the process of combining the data in unique ways until plausible mechanisms can become observed. The process of retroduction itself is to hypothesize mechanisms that can be observed from the data explaining the contexts and outcomes (Vincent & Wapshott, 2014), since the mechanisms are not inherently obvious or explicit and there are no empirical "tests" that can confirm the particular mechanisms. O'Mahoney and Vincent (2014) describe retroduction as a method of imagining a mechanism that could account for the phenomenon if it were real. Retroduction assists with "contingent causality," a key tenant of critical realism, meaning that the mechanism is a causal structure that may be "probabilistic." There could be multiple competing mechanisms, but they are not necessarily deterministic, or always triggering or causing the same outcomes if not in the same contexts (Bygstad, 2016). In Chapter 4, I report on

possible mechanisms considered throughout the retroduction phase and the data considered in postulating mechanisms.

Because retroduction does not happen in a silo, additional iterative abstraction and retroduction were performed as needed to find the mechanisms. This was done by asking *what if* questions, "oscillating" between the known and the possible to discover what the mechanisms may be in these contexts that cause these outcomes. This process allowed for the best theory to explain the data to emerge.

Critical Realism Step 4: Empirical Corroboration

Empirical corroboration is the last "step" of an analytic approach to finding the possible causal explanations in a certain case study. Conversely, this step can also be seen as the first step of pushing knowledge into action or as a jumping-off point for future research. Empirical corroboration uses the outcomes (the data in the domain of the empirical) to review the hypotheses as retroduced and ensure adequate causal/explanatory power of the hypotheses (Hu, 2018). Mingers et al. (2013) use a different formula to describe critical realism that can help further elucidate the critical concepts of empirical corroboration. They call it the DREI method:

- **D**escribe the events of interest,
- **R**etroduce the explanatory mechanisms,
- **E**liminate the false hypotheses, and
- **I**dentify the correct mechanisms.

The E and I of DREI become the goal post-retroduction, falling within the empirical corroboration phase. For this part of the research process, I used the hypotheses developed from the retroduction phase to refine the hypothesized causal links (mechanisms). More simply put, when I reviewed each experienced event (newspaper article), determined how it was translated

(known from Research Question 1), and considered the contexts in which these events were experienced (known from abstraction), I asked the following question: “Does hypothesis A, B, C [per the retroduction] solve the puzzle by fitting into the original equation?” This follows the CMOC formula: **the contexts + the mechanisms = the outcomes**. Using this process of fitting possible hypotheses into the equation for each experienced event, I questioned hypothetical fit and eliminated those hypotheses that did not work to identify the plausible mechanisms. In critical realism research, a key tenant is finding “contingent causality.” Sayer (2000) explains that observability can make us more confident about what we think exists. Therefore, mechanisms that appear to have the tendency to explain multiple outcomes within this case’s contexts can be identified as possible causal explanations.

To further corroborate the findings of Research Question 2, an interview was conducted with an expert in the fields of nutrition and mass communications. This individual has extensive experience in both journalism and the food industry. The individual has participated in journalistic efforts in lay media and, separately, on behalf of corporate affairs for advocacy efforts, which are the two key types of media released in this case. The interview was performed over the phone using the Interview Guide presented in Appendix A. Questions in the Interview Guide were developed to specifically corroborate the postulated mechanisms and identify any additional potential causal mechanisms. I started the interview with some initial questions to jog the memory of my interviewee, given that the DGA, 2020-2025 release was over a year prior to this interview. Since the interviewee had read multiple news articles and the DGA, I was able to move quickly into my proposed mechanisms. Toward the end, I asked open-ended questions about anything missing that would be pertinent for me to dig into deeper. Notes from the interview were transcribed.

The research as completed culminates in a narrative report on the causal mechanisms that have been correctly identified, corroborated, and led to the outcomes (i.e., the attempts to translate published, peer-reviewed nutrition research), as found in Chapter 4. Future research can use this new knowledge as a jumping-off point to further develop and test actionable steps to improve outcomes.

Trustworthiness

Trustworthiness is a critical component of qualitative research. There are multiple ways to enhance trustworthiness. This research employed the concepts of triangulation, use of multimethods, and thick descriptions.

Use of Triangulation

Triangulation is a principle for performing case studies within the critical realism paradigm and is used to enhance trustworthiness. To control for biases and to ensure identification of the appropriate mechanisms, triangulation and use of multiple data sources was critical. For example, I used additional literature, as needed, to work to describe the contexts, discover the mechanisms, corroborate the mechanisms, and manage biases. Triangulation of data also added to the complexity of the case. The iterative nature of this research required returning to the literature many times to corroborate findings. Academic literature, archival documentation of external surveys, and methods of historical analysis were used, and referenced appropriately, to elaborate on the context and assist with making, or refuting, causal connections. For example, this study included research by outside entities such as IFIC, which commonly conducts nationwide sampling surveys on consumer perspectives at a given point in time regarding food and nutrition knowledge. Similarly, the Pew Research Center and the American Press Institute have conducted surveys of American perspectives on communication and news consumption

habits, which assisted in understanding more about the media. All triangulated literature is appropriately referenced throughout this dissertation.

Use of Multimethods

In addition to triangulation, overall use of the Wynn and Williams (2012) principles enhanced the trustworthiness of this work. While Roy Bhaskar (1978) originally described the critical realism paradigm as a flexible lens to use for research, Wynn and Williams were at the forefront of explicitly framing this perspective and distilling it into methodological principles for case study research in their 2012 article. These principles have been further corroborated in more recent research, such as by Bygstad et al. (2016). Using the practical guidance of experienced critical realism researchers added further to the trustworthiness of the process used in this study. I used additional methods, as outlined throughout Chapter 2, including the more structured, but reflexive, thematic analysis as a method for abstraction. I also used a less structured method of narrative memoing, consistently keeping notes across the outcomes, both on paper and within multiple Excel sheets as described further in Chapter 2. These notes assisted with understanding and describing this case and coming to my conclusions. It also provided the ability to provide thick descriptions, a qualitative research technique invented by Ryle and Geertz (Drew, 2021), throughout this dissertation. These are all commonly used methods in qualitative data analysis.

Per the suggestion of my committee members during the proposal defense, an additional step was added to further triangulate and corroborate the findings of Research Question 2. I conducted an anonymized interview with an expert in the field. First, I identified an individual with expertise and extensive experience in both nutrition and mass communications. This individual has participated in journalistic efforts related to nutrition science in both the lay media and, separately, on behalf of corporate affairs for interest groups, which are the two key types of

media released in this case. This expert had read several news articles and also the entirety of the DGA. This expert mentioned that they have previously written both popular press and scientific articles regarding the DGA and DGA-related content, which was as expected since they are an expert in this field. However, there were no articles written by this person and published on December 29, 2020; therefore, this expert did not author any of the popular press articles in the sample reviewed in this study. To ensure anonymity of the interviewee, no further identifiable information will be provided, but the interview was solely used for confirmation and triangulation of the findings of Research Question 2 as a method to enhance trustworthiness.

Use of Thick Descriptions

Transferability is a tenant of trustworthiness in qualitative research. As noted earlier, thick descriptions are a qualitative research technique invented by Ryle and Geertz (Drew, 2021) in which the researcher incorporates additional detail in the writing to provide additional context and interpretation. While the findings of this research cannot be generalized broadly, I include thick descriptions of my process and findings so that readers and future researchers can understand how these findings may, or may not, transfer to their specific setting. This is another example of a way I have worked to enhance trustworthiness in this dissertation work.

Ethical Considerations

This study was submitted to the George Washington University Institutional Review Board, and the determination was made that the project does not meet the definition for human subjects research. This determination was made because the project involved thematic analysis of publicly available documents and did not involve any human subjects, identifiable information, or broadly generalizable findings. Therefore, further review by the George Washington University Institutional Review Board was not required.

Further, aligned with ethical considerations as defined by Terrell (2012), I ensured that the dissertation writing remained "free of bias towards any group (e.g., age, ethnicity, sexual orientation, race, gender, etc.)" and that the study methods were explicitly detailed and fully explained, which provided readers the opportunity to judge the ethical quality.

Another ethical consideration is scientific integrity. As explained in the previous section, trustworthiness remained front of mind throughout this dissertation work. In addition to that, I practiced reflection throughout the process of developing this work. I consistently reflected on the work as it progressed to consider alternative patterns or approaches to rearrange the data in a new way to ensure that the mechanisms found were the most valid. I worked closely with my committee members in the very final stages to ensure that my descriptions were thick, my methods were well aligned, and my findings were consistent with the research as completed.

CHAPTER 4: FINDINGS

Introduction

The goal of this case study was to use a critical realism paradigm to describe how nutrition research is translated by the media and the mechanisms that shape these outcomes using the case of the release of the DGA, 2020-2025. This research was designed to help address a gap in the scientific base regarding the translation of nutrition research to the American public and the possible contribution to widespread nutrition confusion. The research questions for this case study are as follows:

1. How does the news media translate nutrition research?
2. What are the mechanisms that contribute to the translation of nutrition research in the news media?

Research Question 1

This research uses a critical realist paradigm to assess the *how* and *why* of nutrition translation in the media, thereby adding to the research base on nutrition confusion. I framed this question with the CMOC formula as described earlier: **the contexts + the mechanisms = the outcomes**. In this case, the contexts and outcomes are known, or can be discovered, first. The contexts are the DGA, and the outcomes are the news articles that translate the information about the DGA release to the general public via the lay media. I must first understand these two factors to be able to postulate the mechanisms.

Based on the CMOC formula (**the contexts + the mechanisms = the outcomes**), I began with the context. The context in this case is the DGA, 2020-2025. This is the event as it occurred,

regardless of whether it was perceived or experienced in that same way. Research Question 1 of this dissertation seeks to describe the outcomes, which is the event as it was perceived. In this case, therefore, the outcomes are defined as the individual newspaper articles that translated the event (the DGA release) to the public. These were systematically reviewed to understand the message provided to the public and then compared to the context itself. Since the context is known, it was reviewed and described first.

The Context: The Dietary Guidelines for Americans, 2020-2025

The DGA, 2020-2025 were released on December 29, 2020. The DGA are due, by law, to be updated at least every 5 years. This release was therefore due by December 31, 2020, and the administration made it clear that these would be released on time, even though some past versions have been released late. The DGA process has included increasingly more public input; these most recent DGA have been considered the most anticipated by the public to date, based on extraordinary activity throughout the process. The 2020 process included over 250,000 subscriptions to the update emails provided by the government, over 1 million views of the website, and over 160,000 public comments throughout the process—the most to date of any process (USDA & HHS, 2020b).

Due to scrutiny and increased controversy around the DGA from the work done in 2015, the NASEM reviewed the 2015 process and provided extensive feedback to the government. This feedback came with recommendations for improvement. The USDA, the lead department during the 2020 DGA edition, implemented a significant number of the recommendations, such as increasing transparency, providing more opportunity for public comments, and holding more public meetings than ever before. This release also included pre- and post-release media calls and televised media, a *Wall Street Journal* exclusive interview with the Deputy Undersecretary,

updates to Congress and the public, assorted press releases, and additional materials including the following:

- Executive Summary (in English and Spanish)
- Top 10 Things You Need to Know
- Food Sources of Select Nutrients
- The Federal Government's Response for Using the Dietary Guidelines Advisory Committee's Report to Develop the Dietary Guidelines for Americans, 2020–2025
- 20+ Frequently Asked Questions
- Figures and infographics about the DGA
- A list (with links) of peer-reviewed publications published by DGAC members and the federal government about the development process and release
- Slides from the presentations (as presented to the media, health professionals, and assorted consumer groups post-release via webinar)
- Additional resources for professionals
- Additional resources for consumers
- Additional federal resources

This list indicates the ample number of materials media journalists had at their disposal to educate themselves on the key topics and for use in translation to the public. At the time of this writing, all materials are still available on the publicly available website, DietaryGuidelines.gov. Since the DGA and all accompanying materials were available and could be reviewed or retrieved as needed, I began with a high-level review and abstraction of key data to ensure that the context was understood for comparison to the outcomes. Berlo's model provided the operational framework for abstracting data: the content, code, elements, treatment, and structure.

Using this model allowed me to determine the appropriate information to use to define how the event of the release of the DGA actually occurred, as described below.

Result of Abstracting Data to Describe the Content of the Dietary Guidelines (Context)

The DGA is the key document upon which, by law, all food policy in the United States is based. Therefore, the content is incredibly important. Per the HHS website, "the Dietary Guidelines for Americans provides advice on what to eat and drink to meet nutrient needs, promote health, and prevent disease" (USDA & HHS, 2020a). This is created through the employment of a scientifically rigorous process with expert advice and opinion provided to the governmental entities (USDA and HHS) who ultimately write the guidelines in their final form.

As done in past editions, this document covers key nutrition science findings that should be implemented by the public to promote health and prevent disease. It covers key nutrients of concern, both due to a lack of consumption and to overconsumption. It documents critical ways to shift dietary behaviors toward more healthful habits. It also provides science-based dietary patterns that promote health. For the first time, this edition covers these topics for each life stage and is reformatted to cover each life stage separately and distinctly from the other life stages. This is a major change for the DGA. In the past, the DGA covered only Americans aged 2 years or older, with limited information for older adults and no information for infants and toddlers. Based on legislation in the 2014 Farm Bill, the DGA now includes scientific advice for those younger than 2 years, for those who are pregnant and postpartum, and for older adults. For each life stage, the DGA "provides a customizable framework for healthy eating that can be tailored and adapted to meet personal, cultural, and traditional preferences" (USDA & HHS, 2020a). This DGA also strongly emphasizes dietary patterns over individual foods or nutrients. While dietary

patterns have been included in past DGA, this is the first concerted focus on patterns over nutrients.

Importantly, the guidelines provide actionable advice that can be disseminated to the public by professionals, including health professionals, communication processionals, educators, and/or policymakers. In fact, the content is explicitly not developed for a general audience. The scientific information must be appropriately translated in an actionable way to promote understanding of proper nutrition and dietary patterns and to avoid nutrition confusion.

This most recent version spans 164 pages and is publicly available on the USDA and HHS websites. The DGA is, by law, provided by the Secretaries of USDA and HHS, so the document begins with a letter from both. This edition includes an introduction, six chapters, and several appendices, which are described in detail below (USDA & HHS, 2020a).

Introduction.

The introduction includes information on what the DGA is and is not and how the DGA was developed. For example, the DGA is for general health promotion and disease prevention, not disease treatment. It encompasses guidance for a nationally representative American and covers appropriate shifts for dietary health. The introduction also covers how these DGA were developed. As mentioned, this edition used a new process based on the recommendations from NASEM. Transparency was greatly increased, and the public was able to participate to a much larger extent than ever before. The introduction also explained the scientific rigor this process employs and the wide impact of the resulting guidelines.

Chapter 1.

The first chapter covers the key guidelines, or the key recommendations that are overarching across the entire lifespan. These guidelines could be considered the key takeaways

of this work. The guidelines themselves apply across all life stages and are the key recommendations within the DGA. The guidelines are referenced throughout the remaining DGA chapters. The 2020–2025 edition includes four key guidelines, as shown in Figure 13 and noted here:

1. Follow a healthy dietary pattern at every life stage.
2. Customize and enjoy nutrient-dense food and beverage choices to reflect personal preferences, cultural traditions, and budgetary considerations.
3. Focus on meeting food group needs with nutrient-dense foods and beverages, and stay within calorie limits.
4. Limit foods and beverages higher in added sugars, saturated fat, and sodium, and limit alcoholic beverages. (USDA & HHS, 2020a)

Figure 13: Four Key Guidelines of the Dietary Guidelines for Americans, 2020-2025

Source. USDA and HHS (2020c).

Chapters 2 and 5.

Chapters 2 and 5 include populations that are new to the DGA. As a result of the 2014 Farm Bill, the infant, toddler, pregnant, and postpartum populations are now included in the DGA for the first time in its history (USDA & HHS, 2020a). This is a monumental change to this document. While mandated in the Farm Bill, this Birth to 24 (B-24) Project was in the making for many years. Pulling together all of the scientific evidence in a rigorous way began at the USDA in 2012, and pregnant/postpartum individuals were added to the list of new subpopulations, making this the "B-24/p Project." This massive undertaking became a key part of the 2020 DGA and, as such, makes up a significant portion of the document. Special nutrient considerations are also included for each life stage. For example, the guidelines include appropriate feeding patterns for infants and toddlers as well as recommendations for caffeine and alcohol consumption during pregnancy and postpartum.

Chapters 3, 4, and 6.

As with past editions, the general content of the DGA covers healthy dietary patterns that should be a goal for individual consumption from ages 2 through adulthood. The DGA also covers current intakes of the nationally representative population and recommendations for supporting healthy eating. There are nutrients of concern due to overconsumption and nutrients of concern due to underconsumption. For the first time, however, this content is broken down by life stage in Chapters 3, 4, and 6, providing tailored information for children and adolescents, adults, and older adults, respectively. This new format provides special nutrient considerations for each life stage, such as dairy needs for children, fiber needs for adults, and protein needs in older adulthood. Chapter 4 also includes recommendations around moderation regarding alcohol intake. Both children and adults have special considerations related to added sugars.

Results of Abstracting Data to Describe the Code, Elements, Treatment, and Structure of the Dietary Guidelines (Context)

The *code* explains the form of delivery of the article (Berlo, 1960). The DGA are available online and for PDF download on a publicly available website. The elements are the accompaniments that can be found within the document as content itself or surrounding the content, such as quotes, links, charts, graphs, graphics and pictures, other figures, and so on (Berlo, 1960). The full copy includes many *elements*, including links to references, graphics, charts and figures, specialized call outs around key items in the text (such as terms to know), meal planning, images of healthy food and Americans, and more. *Treatment* can be synonymous with the "tone" of the article. The text and imagery are set in a positive tone that is both encouraging and explanatory. There is a focus on the current practices and discussions on how to shift toward better, scientifically based, healthier practices.

The *structure* of these guidelines is key because it is far different from the past. The DGA themselves have evolved tremendously from one- to two-page pamphlets to what we have today—164 pages of content on healthy eating and promoting good habits. Further, this is then restructured into various handouts and educational materials, and it sets the basis for MyPlate (the government's healthy eating guide) and all U.S.-based nutrition policy. As these have evolved, they have grown longer and more scientifically rigorous. However, they have always focused on the majority of the population—from age 2 through adulthood. While focused on a more condensed population, they have historically been structured by guideline, recommendation, or scientific topic. For the first time, the DGA, 2020-2025 begin at birth and have additional information for special populations including birth to 24 months, pregnant women, and older adults. The structure was changed for this edition to highlight this addition.

While the first chapter highlights the guidelines and key recommendations themselves, the remaining chapters follow a life-stage approach.

The Outcomes: The 20 Media Articles

To address Research Question 1, I conducted RTA of the outcomes: the news articles covering the release of the DGA. As described in Chapter 3, RTA involves coding each article and generating themes. As stated above, I began with a thorough review of both the context and the outcomes. Once I had reviewed everything at least once, I started with the RTA of the events as experienced, the news articles, to pull out the key themes of content. As done with the context (DGA, 2020-2025), Berlo's model provided the framework for abstracting data: the content, code, elements, treatment, and structure. This work allowed me to define how the event of the release of the DGA was experienced by the American public, as described below.

Results of Abstracting Data to Describe the Content of the Media Articles (Outcomes)

The analytic process for identifying content from the news articles is described in Chapter 3. Generally, the articles were highly variable in content, tone, and amount of education provided. This is consistent with the findings of Robinson et al. (2013), as discussed in Chapter 2. As I was compiling the RTA results, I noticed some significant differences between what I had familiarized myself with when I initially read the DGA. Once I had the initial draft key themes from my RTA of the news articles, I was able to review the DGA again focused on determining if these key themes discovered from the outcomes (what was experienced in the Empirical Domain) were reflective of translation of the context (what occurred in the Actual Domain). It is through this comparing and contrasting of the two stratified domains that the potential mechanisms that connect the two can be identified (the Real Domain). As a result of this process,

key themes emerged from the 20 articles. The content of the media articles focused on the following:

- Actionable advice
- "Missing" information or "incomplete" guidelines
- Controversy
- Wide impact
- Novel information

Each theme is discussed next.

Actionable Advice

The actionable advice theme refers to the discussion within the DGA about making the guidelines feasible, with healthy shifts in dietary patterns. Importantly, the DGA are written for a professional audience. The government looks to professionals to translate the advice to the public. The media talking about the actionable advice and providing links to the guidelines allows the reader to know where to find the information but providing links does not translate the science in a way that would enhance understanding and decrease nutrition confusion for a lay audience. For example, all but one article included mention of the birth- to 24-months and pregnant/postpartum populations. The inclusion of these populations was a significant change and important part of the release of the DGA. The birth- to 24-months population was covered in Chapter 2 of the guidelines, while the pregnant and postpartum populations were discussed in Chapter 5. Two of six total chapters were dedicated to these life stages, which were included in the guidelines for the first time. These chapters provided actionable advice for infant and toddler feeding practices and special nutrient considerations for each population. Appropriately, a majority of the news covered this, especially since it could be considered a "newsworthy"

change in the DGA. These two life stages, together, were the most robustly discussed in the DGA (given that each of the other chapters were specific to other populations). Only 50% of the articles in the sample, however, actually included any actionable advice on how these populations should shift their dietary patterns, like the DGA does, with 50% of these articles having been placed by interest groups to promote the DGA advice regarding a specific commodity. Further, this "actionable advice" was typically provided as direct text from the DGA versus an easy-to-understand or "consumer-friendly" translation of the advice. This finding mimics results from Basu and Hogard (2008), who also "identified a lack of practical dietary guidance" in the popular press articles they reviewed (p. 1127). The key takeaways from the news articles would not necessarily provide a pregnant person, or new mother, the ability to confidently walk away with key points about nutritional needs and dietary concerns for her baby and/or herself from these news articles. Saying there is actionable advice, but not providing it, is not effective translation.

Missing or Incomplete Information.

Ten of the articles referenced that there was information missing, incomplete, or inadequately researched in the DGA. This critique of the DGA is due, in large part, to the science not being "settled" when it comes to nutrition. This was covered by the news media in a few different ways. For example, there was a lot of discussion by interest groups, throughout the process, around scientific issues that were deemed out of scope at the onset of the DGA update.

There is only so much scientific evidence that can be rigorously reviewed every 5 years. To manage workloads and ensure that robust reviews can be completed, the specific scientific questions that will be addressed throughout the DGA process are determined at the very beginning. Traditionally, the determination of the scientific questions to be reviewed has

occurred with the help of the scientific experts on the DGAC. However, based on the recommendations from NASEM, the questions for the latest DGA were developed before the committee was assembled. The questions were also released publicly in 2020 for the first time in DGA history. The questions were developed and provided to the public in advance for public comment. It was at that point that the public could weigh in on whether questions were missing or if the proposed scope of work needed to change. For example, in 2020, fad diets were not included in the list of scientific questions. Likewise, sustainability and climate change were deemed out of scope. Of note, the sustainability discussion has, for the last two editions, been deemed out of scope by Secretaries of Agriculture Tom Vilsack and Sonny Perdue during the 2015 and 2020 processes, respectively.

As another example, the *New York Times* article by Rabin (2020) stated:

> the latest guidelines do not address the current pandemic or new scientific consensus about the need to adopt dietary patterns that reduce food insecurity and chronic diseases. Climate change does not figure in the advice, which does not address sustainability or GHG emissions.

This is a robust list of "missing information." Providing the additional background on why the information was not included could have provided the reader a better understanding and helped dispel confusion. For example, as discussed above, sustainability has not been included in the DGA conversation since its inception and was explicitly excluded in the last two editions. Chronic disease, to the effect that it is preventable through nutrition, is included in the context of prevention and health promotion but treatment of disease is not, as treatment needs to be handled individually by a health care professional. Similarly, the pandemic began in March 2020, when the 5-year process for the DGA, 2020-2025 was almost complete. This was not something that

could have been foreseen and was not included in the scientific questions, which sets the scope and must be addressed. Addressing research related to the COVID-19 pandemic in the 2020 DGA would have been stepping out of scope as it was not part of the defined mission at the beginning of the process; however, it was mentioned in the introductory chapter in relation to the importance of health and the connection of health to diet. All of this is important context that could address fear or doubt in the "missing information" that the reader does not get.

As another example, the article by Kimberly Leonard (2020) published in *Business Insider* mentions that "the guidelines leave people in the dark about fad diets." This is technically a true statement, because fad diets were not covered in the document; instead, healthy dietary patterns were provided. The goal of the DGA is to promote health and prevent disease. Research has indicated that fad diets do the opposite; they can be harmful to health and "there is no research proving fad diets are safe in the long term" (Sciarrillo et al., 2020). While this could be a scientific topic of interest in the future, this was not covered in the DGA scoping questions for 2020 and therefore was not reviewed as scientific evidence.

As one last example, the *AgriPulse* article by Chase (2020) states that the DGA "stops short of including a key committee recommendation to reduce intake of added sugars." The DGA, however, must include scientifically sound recommendations and not opinions—not even expert opinions. Per the USDA and HHS (2020d), "Any revisions to previous editions of the Dietary Guidelines must have sufficient scientific justification, and by law, must be based on the preponderance of scientific and medical knowledge current at the time." Throughout the DGA development process, there has been substantial controversy about how much would be included, what constitutes expert opinion versus empirical findings, and what science is mature versus nascent. By law, the DGA cannot "go too far." The DGA can only make recommendations that

are scientifically rigorous, as these recommendations will influence the health and well-being of the entire American public, as it forms the base of all nutrition policy in the United States. While it is a fair critique from journalists to state that there were scientific opinions "missing" from these guidelines, it is worth considering the effect this type of information could have on nutrition confusion. Thus, it would be important to explain why or to provide confirmation of the scientific evidence in order to alleviate nutrition confusion among the public reading this media report. That was not always done for the public, even though it was available for the journalists. In fact, the USDA and HHS have provided extensive explanation regarding the process taken, what questions were developed, and why the questions were developed first, including answers to a robust list of Frequently Asked Questions. This information remains publicly available on the website today. The USDA and HHS released a bevy of information on the scientific process they followed and why it could be perceived that information discussed and ultimately recommended by the committee of scientific experts was not finalized by the government within the current edition of the DGA. This type of explanation is critical, as it can limit confusion or negative attitudes around dietary advice. Nutrition confusion is based on the feeling that there is missing, conflicting, or constantly changing information in the scientific field. This key theme illustrates that the news articles on the DGA release included in this study could have fed into that fear versus negating it.

Controversy

The controversy theme refers specifically to disputes about specific recommendations concerning added sugars and alcohol—two key issues that were of hot debate throughout the process and played out in the media, especially on the day of DGA release. For example, Katie Camero (2020) stated in the *Miami Herald*, "for the most part the new guidelines mirror previous

versions, but two controversial topics stood out." This was depicted in the media as "going against the science," which made it highly controversial; however, the actual issues were much more nuanced. For example, the added sugars recommendation in the 2015 DGA stated that there should be a limit of 10% of added sugars in Americans' daily diets. Currently, when looking at a nationally representative sample of Americans, consumption is greater than this (USDA Agricultural Research Service, 2020). This means there needs to be a shift toward lowering added sugars across the board. Throughout the expert committee's deliberations, there was discussion around added sugars. Food pattern modeling exercises showed that added sugars recommendations could be as low as 6% for some populations. The foods used to develop the models included additional small levels of additional added sugars (1.5%–1.9%), as well (USDA & HHS, 2020d). This is the same finding from the 2015 DGAC, who set the 10% limit. In fact, both the food pattern models for the latest DGA were nearly identical to those of the 2015 committee (USDA & HHS, 2020d). These results, however, were interpreted differently to come to a different recommendation. While expert opinion is critical to developing the recommendations, this is an example of the scientific nuance around the development of the DGA that can lead to important scientific discussions but that could cause confusion for the lay consumer.

Between 2015 and 2020, there was not substantially new evidence on this topic. There was one systematic review on added sugars completed during the DGA process in 2020, which resulted in limited or grade-not-assignable conclusions (DGAC, 2020). There was only one article found in the many systematic reviews that included any percentage recommendation. That article, a longitudinal study in female adolescents, found 10% as an appropriate limit to shift toward (see Lee et al., 2014; for the complete list of DGAC references, also see part D, pp. 26–

28, in DGAC, 2020). As discussed, the DGA have a preponderance of evidence standard that must, by law, be followed. The preponderance of evidence during the 2020 process maintained the 10% limit set by the 2015 committee (Snetselaar et al., 2021). Per USDA and HHS (2020a), "The introduction of [the] quantitative recommendation [in 2015] was based on significant scientific agreement from data analysis, systematic reviews, and food pattern modeling, and largely, the science has not changed." Therefore, it was maintained in the final guidelines. Importantly, however, there was a strong stance on lowering intake of added sugars throughout the 2020 DGA. One of the four key guidelines was to decrease added sugar. In addition, each chapter had a special nutrition consideration around added sugars that discussed a need to lower sugar, especially if consuming more than 10%. Finally, examples were provided with healthy eating patterns that are low in added sugars. There is no question that the nutrition policies developed after these guidelines will continue to recommend the reduction of added sugars. It is important that food and nutrition policy is based on the scientific evidence because it can affect the health of the entire population, especially those reliant on nutrition assistance programs. Therefore, the DGA sets the standards for all nutrition policies in the United States. This includes standards for the school meals programs, food package determinations for women, infants, children, food banks, and food provided to seniors and individuals living on indigenous reservations. This is also broader than just nutrition assistance programs. Registered dietitians working for the military base decisions on the DGA. Even more broadly, the 2016 changes to the Nutrition Facts Panel, the first substantial change since its inception, were based on the 2015 DGA. This change moved forward with a separate line item on the Nutrition Facts Panel for added sugars, requiring a percentage denotation based on the 10% limit set by the 2015 DGA.

In the popular press review, 14 of the 20 articles mentioned the added sugars "controversy." But the controversy itself is scientific discussion around how much added sugars intake over an entire healthy dietary pattern is the appropriate limit. The lay American would typically be unable to understand the difference between 10% and 6% if developing their own dietary pattern. This is a scientific discussion that needs further research, but it is not actionable advice for the public. Professionals interpreting this scientific evidence, who can understand the difference, are able to use the DGA to develop, for example, individual dietary patterns that meet their patients' individual needs or appropriate nutrition policies for population health. For the lay public, the message, as contained in the DGA, should be to lower consumption of added sugars to promote health and prevent disease. Whether that limit stays at 10%, is ultimately set to 6% in future editions, or is a different number entirely, Americans, on average, consume significantly more added sugars than recommended and should reduce their intake. So, generally speaking, the recommendation for the lay public should be to reduce sugar.

The key to this "controversy" is that it was, in fact, controversial among the scientific community. Scientific discussion on this topic remains hotly debated today. By the DGAC's own admission, there is limited evidence; the available evidence includes many limitations that are commonly seen in nutrition research. Thus, it is likely that added sugars intake will continue to be debated for years to come. Similarly to the missing information theme, when these conversations play out in the media, this could lead to increased nutrition confusion and general disregard for the DGA if they are not explained, if they were presented in a negative tone, or if they followed a headline that may be disparaging to the scientists who developed the DGA. A potential question to guide future research: if the media presented this information in a factual manner to help educate the audience, could it ultimately decrease confusion? Some articles

within the sample presented the material in a debate format, providing both sides and allowing the reader to make their own fact-based decisions. The limited empirical evidence on this subject is unclear and could be reader specific. For example, Chang (2013, 2015) found that a two-sided article, presenting both viewpoints, was perceived as more contradictory and increased ambivalence among consumers compared to one-sided positive-toned articles. The sample in this research, however, also included one-sided negative-toned articles, which was not reviewed as part of the research by Chang.

As Clark et al. (2019) point out, "dietary debates" playing out in the mainstream media can lead to negative effects in two ways. First, they can influence how people make short-term dietary decisions (in comparison to long-term healthy lifestyle changes). Second and potentially even more concerning, future efforts of nutrition communication may be compromised. If the goal is to reduce confusion, the possibility exists that explaining both sides of a debate to an audience, factually, would provide the audience with a more complete understanding and less confusion overall. Clark et al. (2019) tested this hypothesis, "sequential exposure to contradictory news stories in the media … can negatively influence consumers' attitudes, beliefs and behavioural intentions." (p. 3344). More research on this topic is needed in order to determine the pros and cons of the style of providing information that will most benefit positive attitudes and decrease confusion around nutrition.

Of note, some articles also played into the political aspect of the controversy. In *Politico*, Bottemiller Evich (2020) stated that the "Trump administration rejected external scientific recommendations" and "government decided to keep Obama era advice for added sugars." While the administration plays an overall leadership role in the development of the DGA, this type of framing calls into question the scientific rigor of the overall process, which to a politically

focused audience would likely be viewed as controversial and "click-worthy" news compared to a story on nutrition science. These codes also lead into this overarching theme. Controversy is a critical aspect that can lead to nutrition confusion among the public, likely leading to perceptions of doubt. So, this is an important theme that was touched upon by most of the articles.

Wide Impact

The wide impact theme refers to the many articles that talked about the *so what* of the guidelines—specifically, the power they have over nutrition policy in the United States. The DGA is the scientific basis for all policies that deal with diet, as it is required, by law, that the whole of the U.S. government promote the DGA through any nutrition and health-related programs (National Nutrition Monitoring and Related Research Act, 1990). Two examples illustrating this theme are as follows: "the guidelines have a huge influence on what Americans consider healthy and affect companies, labels, and programs" (Leonard, 2020) and "this document will now serve as the basis of school lunch programs, nutrition education efforts, national health objectives, and even disease prevention initiatives for the next 5 years until an updated version is released" (Camero, 2020).

The wide impact of the guidelines was only touched on briefly in Chapter 1 of the guidelines themselves (USDA & HHS, 2020a) to set the stage for their use. Meanwhile, the impact was referenced in half of this case study sample, mostly in articles making the case that inadequate or wrong DGA would negatively impact the American public. A common example used was school children, given that regulations that set the nutrition standards for meals served in schools are based on the DGA. Using the same added sugars example as above, there was media coverage connecting the added sugars controversy with a lack of "following the science" and the increasing childhood obesity rates. While these can all be connected and, in fact, the

premise of this dissertation research connects nutrition confusion with obesity and other nutrition-related health issues, it is important to provide the context. The DGA did not disregard added sugars or go against the science to recommend increasing sugar consumption. In fact, the DGA consistently, throughout, recommends decreases in consumption and the reduction and/or avoidance of unnecessary added sugars is a special consideration for children and adolescents. This is important context for the news media to include. Without proper explanation, this could lead to both nutrition backlash and loss of trust in the government entities providing these recommendations.

Novel information

The novel information theme refers mostly to the addition of the birth- to 24-months population to the DGA, 2020-2025. The infant and toddler population had never been considered in previous DGA editions and was mandated for inclusion in the 2020 edition by the 2014 Farm Bill. While pregnancy and postpartum nutrition have been minimally discussed within the guidelines before within the context of adulthood, this was the first set of DGA with a specific focus on pregnancy and postpartum populations. Similarly, older adulthood had also been minimally considered in earlier editions, but this was the first time they were robustly covered as a special category. Therefore, these additions were covered in all but one news article. However, part of the definition of nutrition confusion is inciting concern over constantly changing or constantly new science. Discussing these additions as "firsts" could promote these feelings unnecessarily. The science on these populations was not necessarily "new," but the framing of the articles as this being new did not explain this fact to the public. Instead, consumers could come away from the popular press' presentation thinking that the science is new. These "new" guidelines still provide the preponderance of the evidence on these special populations.

Furthermore, the project to include these special populations in future dietary guidance was a long-standing robust process that began around 2012. The government took time and effort to ensure that the eventual new guidelines for these populations, included in the DGA for the first time in 2020, were based on sound evidence. This context was not commonly discussed in the articles in this study, with only one article going back to the Farm Bill and none going back as far as the 2012 inception of this work. Someone who wanted to understand the robust background of this project would need to consult the government websites or an expert in the field. This context would have helped a reader understand that while this is the first time these type of guidelines were included, this was done because of a change to the law to include these populations—not due to new, changing, or unsettled scientific discovery.

Relationship Between Content and Nutrition Confusion

Before discussing these themes, it is important to discuss the key messages taken from the articles holistically. The articles as a group were wide ranging and sometimes focused on very specific topics that comprised a small aspect of the DGA. While this is not problematic when viewed separately, the highly variable nature across the entire sample could be described as contradictory when viewed together. Contradictory information has been found to incite nutrition confusion and nutrition backlash (Clark et al., 2019). For example, the article by Toaspern (2020) focused solely on potatoes and their health benefits. The author did include actionable advice, which ultimately became a key theme, as well as direct text from the DGA regarding potatoes and the health benefits of vegetables. The article was highly positive in tone. However, it is critical to note that if this was the only article a consumer read on the DGA release, they would walk away with a very different picture of the DGA than if they read another article. Across the articles themselves, the variability was significant. This reflects the limited

evidence currently available on this topic. Specifically, Robinson et al. (2013) found "significant differences in the quality of reporting within and between major daily UK newspapers" (p. 39). In addition, Basu and Hogard (2008) found that "reporting on nutrition research is not sufficiently accurate, balanced or contextualised, and public attitudes towards the reporting are not wholly favourable" (p. 1124). More recent research has built on this, making connections between these findings and increased nutrition confusion, which is positively correlated with nutrition backlash (Clark et al., 2019; Lee et al., 2018). This is a critical piece of the puzzle of this research. The key gap to be addressed is the nutrition confusion in the general public that has been found in other research as a result of poor translation of research by the media, as discussed in Chapter 2. The findings of this study begin to add to this research base. Do the key themes of actionable advice, controversy, missing information, wide impact, and firsts (or the science being new information) lead to feelings of increased nutrition confusion, instead of decreased confusion? Based on the literature around nutrition confusion, the answer would be, "Likely." While nutrition confusion itself is a general lack of understanding around nutrition by the general public, the body of evidence to date (as discussed in Chapter 2) concludes that this confusion is a result of contradictory information, negative attitudes, and a feeling that the science is always changing, unsettled, or constantly new. Using this definition, nutrition confusion emerges as an overarching theme of the news cycle covering the DGA on December 29, 2020. The themes relating to the context translation (Actual Domain) suggest an inadequate reflection of the scientific literature that is provided in the guidelines. Although not entirely negative or positive, which will be discussed as a key consideration later in this chapter, I observed that individuals could walk away from any given article with an entirely different view of the DGA than

someone reading a different article. This suggests a logical line that can be drawn to nutrition confusion. First, I will review each theme separately.

Key Takeaways Regarding Content

The key takeaway when comparing the media articles to the DGA text, which will be discussed further in Chapter 5, is that there are dramatic differences in what the public would be able to learn from the media on the DGA versus what they would learn from reading the DGA themselves. This is very important because the DGA themselves are written for a professional audience to use as "information to develop programs, policies, and communication for the general public" (HHS, 2022; USDA & HHS, 2022a). This is an important consideration for translation. Providing links to the DGA within the popular press is good for referencing purposes and for other professionals reading the popular press articles to use. This is not knowledge translation. Knowledge translation was originally defined by the Canadian Institutes of Health Research (2005) as "the exchange, synthesis and ethically-sound application of knowledge—within a complex system of interactions among researchers and users" (para. 2). Building on this, the World Health Organization (2006) adapted the definition of knowledge translation as "the synthesis, exchange, and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people's health" (p. 1).

By using these definitions to look for knowledge translation, some examples can be identified in the media articles examined. For example, the potato-focused commodity groups placed an article in a prominent news source that communicated the positive findings contained within the DGA around potatoes . Similarly, other interest groups placed articles around the positive findings regarding whole and enriched grains, eggs, dairy, and the infant feeding-

specific recommendations. A positive of these articles is that they contained actionable advice, specific to their chosen commodity, mostly via pulling direct text from the DGA itself. Therefore, they could contribute to positive education around nutrition advice to the general public. A counterpoint would be that they were all placed by groups that would benefit from these positive communications around their commodity. This could raise questions and concerns pertaining to bias and could lead the public to perceive these educational articles as inaccurate or misleading. These articles, while positive, are perhaps skewed. This information also needs to be taken together with the other considerations around the message. The variability in content is contradictory in nature and could contribute to increased nutrition confusion, depending on the specific article or combination of articles the lay public reads. This information needs to be combined with the variability in tone, elements, and structure, as outlined next.

Results of Abstracting Data to Describe the Code, Elements, Treatment, and Structure of the Media Articles (Outcomes)

As part of the analysis, I also kept notes regarding the other considerations in Berlo's model besides content. After I finished the RTA, I returned to explicitly reviewing the other considerations from the message. As a reminder, the message is the critical piece of the Berlo SMCR model that this study is considering, which is made up of five concepts: content, elements, code, treatment, and structure.

In this study, the code was the same for all events (online digital print), so the major analytic task was to review each article for the elements, treatment, and structure. As I went through each, I kept notes on the Excel spreadsheet I had created for the content. The results of abstracting data to describe the elements, treatment, and structure of the media articles are provided below.

Elements

The elements are the accompaniments that can be found within or surrounding the content, such as quotes, links, and so on (Berlo, 1960). Elements were key in this research and in finalizing the key themes. Quotes and expert opinion were heavily used elements throughout the articles. Direct text from the DGA was also used. Important to the determination of key themes was the element of education. For example, one of the key themes was that the guidelines were actionable. While nearly all articles (80%) mentioned in some form that the DGA advice was actionable they rarely provided the actionable advice for the consumers. This was reviewed through the lens of the articles being either *educational* or *non-educational*. I defined *educational* for the purposes of this research as an article that allowed the reader to walk away with a deeper understanding of some facts related to nutrition. Twelve (60%) of the articles were educational in one way or another but did not necessarily provide the "actionable advice" from the DGA, which would be the ultimate goal to lower nutrition confusion. "Educational" articles were coded as such if they provided the reader with significant information on nutrition. "Non-educational" articles were those that strictly reported on the news of the release, or on one of the items of controversy, without educating the reader on the DGA or any of the underlying nutrition research. Again, four of the eight non-educational articles still mentioned that the DGA was actionable but provided no education to the reader. I set this dichotomy while reviewing the articles, as I determined it to be an important potential consideration to track for retroducing why the content was similar or different from the DGA and how the article may or may not contribute to nutrition confusion. In this complex case, however, it is not true that educational articles had positive effects while non-educational articles had negative effects.

The distribution of articles was 12 educational (60%) and eight non-educational (40%). Importantly, of the 60% that were educational, not all education was direct DGA content. For example, one article provided education on the historical context around how the DGA came to be, and another educated the audience on sugar laws and policies happening at the local and national levels. This is contextually relevant to the DGA but not specific to the nutrition research contained within the DGA. As another example, an article was presented as a debate around diets that contain meat and health effects of this type of dietary pattern, focusing heavily on the science compared to the arguments from advocacy, but was not focused on educating about what was in the DGA and instead condemned the DGA for "missing" information when it comes to specific types of diets (meat-eating, plant-based, low carbohydrate). There was also one article that educated on the specifics of how to make dietary shifts, per the DGA, but elicited feelings of negativity based on the tone and/or commentary, which, while educational, could lead to increased perceptions of nutrition confusion. The educational versus non-educational dichotomy, as set, is important because it potentially relates directly to nutrition confusion. Clark et al. (2019) provides empirical evidence that nutrition confusion could be fueled by media, stating, "Contradictory nutrition information in the news media can negatively affect consumers' attitudes, beliefs and behavioural intentions" (p. 3336). It would therefore be reasonable to expect increased confusion if an article is educating on laws on added sugars or advice on sugar consumption, while simultaneously sharing concerns that the science was handled incorrectly or is missing from the guidelines themselves. Similarly, it would be reasonable to believe that a negative tone could negatively affect consumers' attitudes about the guideline. Therefore, if an article provided actionable information but with negatively toned commentary, increased nutrition confusion could be the result. Five of the articles that were educational were also placed

by a specific commodity or industry group, and they only discussed that singular commodity (egg, potato, dairy, infant nutrition, and grains). While these articles can clearly be denoted as biased to a specific industry, they were highly factual, contained direct or indirect text from the DGA, 2020-2025 and provided the audience with highly actionable dietary advice around their chosen commodity. While the articles were factual to the singular topic they discussed, this could be positively skewed, or they may be omitting information. While these were highly educational articles, there would be concerns with interest group placement, which is an important consideration addressed during the postulation of mechanisms to answer Research Question 2 (discussed later in this chapter). Further, the main content of the DGA is a focus on holistic dietary patterns. Focusing on one commodity, food group, or category does not consider the overall context and message of the DGA being a healthy dietary pattern. That leaves 60% of the articles providing commentary on the release of the research, and not educating the audience on the facts of the nutrition research. Given this high level of variability in the translation of nutrition research, it can be assessed that there is work to be done when it comes to how nutrition research is translated by the news media. Again, this observation mimics the past findings of the limited empirical evidence on this topic.

When it comes to the commentary around the DGA release, who is cited in support of the message is important. Commentary and direct references from interest groups were widely used to provide context and "expert" input (these could be public health advocates or industry advocates). In total, 13 of the 20 articles (65%) included at least one direct quote (text or commentary), while most included more than one quote. Within that group of 13 articles, most cited one or more sources with a direct quote or text, but the actual sources used were mixed. As illustrated in Figure 14,

- 50% quoted an industry source;
- 50% quoted aa health advocate source;
- 50% quoted the DGA text itself;
- 45% cited a government official or spokesperson;
- 40% cited an outside source, either via citing one of the other news articles that was published earlier in the day or by quoting an expert that was not related to the release or some advocacy group (government, industry, or public health related), such as an NBC news contributor; and
- 20% quoted a member of the Dietary Guidelines Advisory Committee.

This commentary was included in the media articles as a critical element that could lead to perceptions of either legitimacy or illegitimacy, depending on the quotes. Using the element of direct quotes was necessary in the news articles for contextual purposes and was a key element of many of the articles. Yet the quotes were significantly geared toward context instead of education on the guidelines, which is not adequate for educating the public on the nutrition actions they should take to shift their dietary patterns. The release of the DGA is a key "hook" that elicited a strong reaction from the media and could be a prime opportunity to educate the public on diet and nutrition. However, the content was mostly contextual in nature and not focused on the nutrition information that needs to be shared with the public to properly educate on diet.

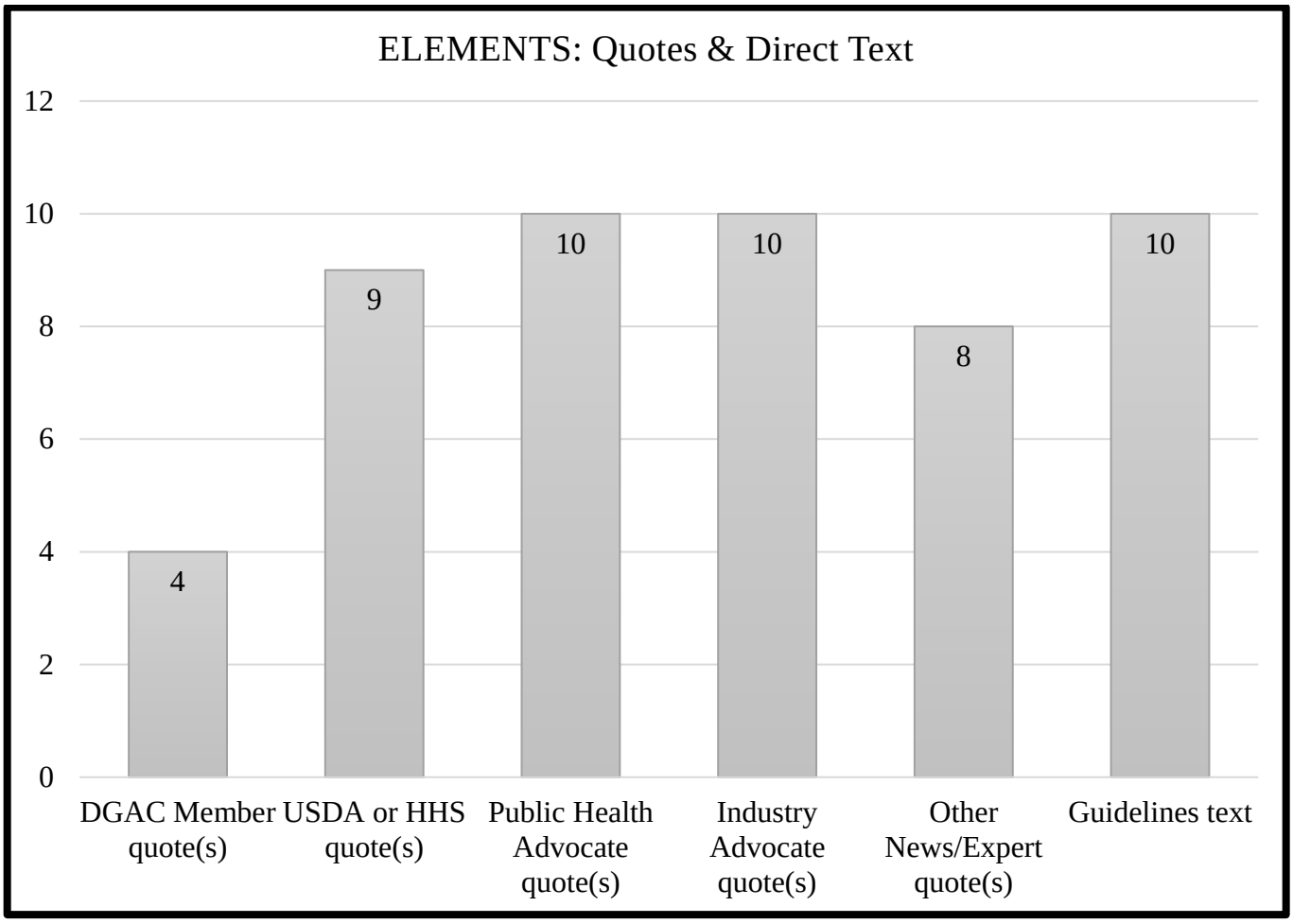

Figure 14: Elements from Quotes and Direct Text

As depicted in Figure 15, not a single article included graphs or charts from the DGA or any source to provide information in a graphical form. However, most (80%) did include clickable links to the guidelines or other complementary sources within the text for the readers to use as a reference. Approximately one-third of the articles also included related articles as recommended reading. While this provides access to the document for further review by the audience, the document itself is long and written for a professional audience. Providing a link or a reference does not adequately educate the reader on the topic.

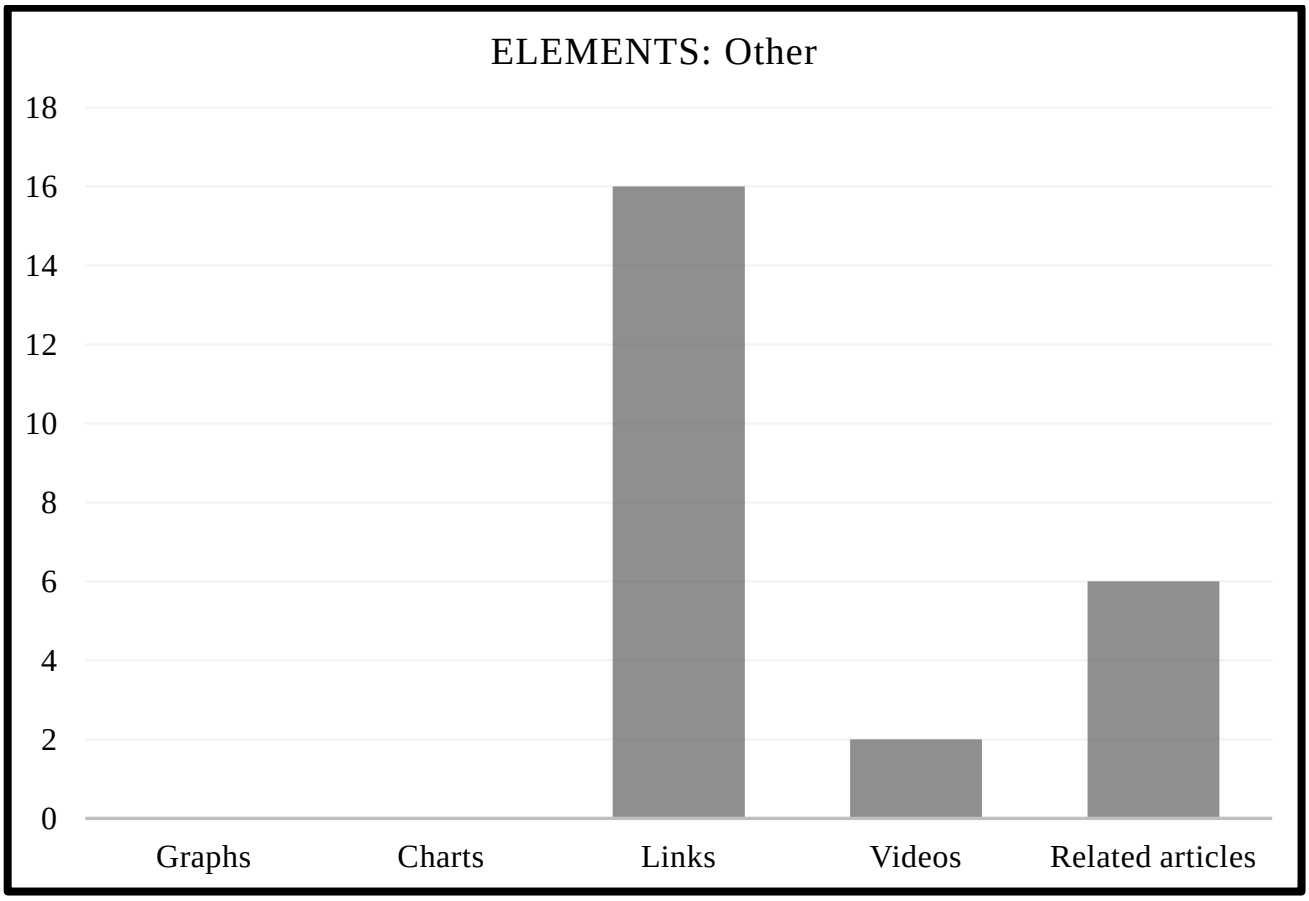

Figure 15: Other Elements

Treatment

Treatment can be synonymous with the "tone" of the article. While this may be seen as a more subjective consideration, per the Berlo model it is relating to positive or negative language used. As I reviewed the articles, I considered the following:

- Did the language elicit feelings of negativity or an overly positive feeling?
- Did the language portray the facts without strong biases detected?
- Did the language focus on the negative, using language like "rejects" or "disagrees" or a similar word that indicates there was something done that people did not like?

- Did the language focus on the positive, using language like “applauds” or a similar word that indicates people did like the outcome?
- How do I feel about the parties involved after reading this article?
- Do I suddenly feel angry or happy? Did the articles elicit strong emotions?

This can also include language around political and social contexts. Based on the language used, I categorized the articles as positive, negative, or neutral. For example, many of the negative articles began with negative language in the title—the government “rejects,” “ignores,” or “sidesteps” the science. This can even be noticed in the list of articles chosen for this research (found in Chapter 3). The title of an article can be key in gaining a reader’s interest in and getting them to click and actually read the article; so, the title it is an important consideration when it comes to treatment. This is also a reason the title and content do not always match. Overall, as seen in Figure 16, the treatment of the articles was evenly split between positive, negative, and neutral language. If an individual read only one article, they could come away with a much different message, based on the content and treatment, than if they read another article. More importantly, if someone gained interest in the content and read more than one article, there was an equal chance they read two articles that were given very different treatment by the journalists. This could be contradictory and lead to increased nutrition confusion. Potentially, this could lead to someone reading even more articles about the same topic, which again would give them an equal chance of getting multiple positive, negative, or factual articles—providing potentially more contradiction and leading to even more nutrition confusion. Per the literature on this topic, finding more contradiction while reviewing more articles is a concern when it comes to not only nutrition confusion but also the subsequent nutrition backlash. As succinctly stated by Nagler in 2014,

exposure to conflicting information on the health benefits and risks of, for example, wine, fish, and coffee consumption is associated with confusion about what foods are best to eat and the belief that nutrition scientists keep changing their minds. There is evidence that these beliefs, in turn, may lead people to doubt nutrition and health recommendations more generally—including those that are not rife with contradictory information. (p. 24)

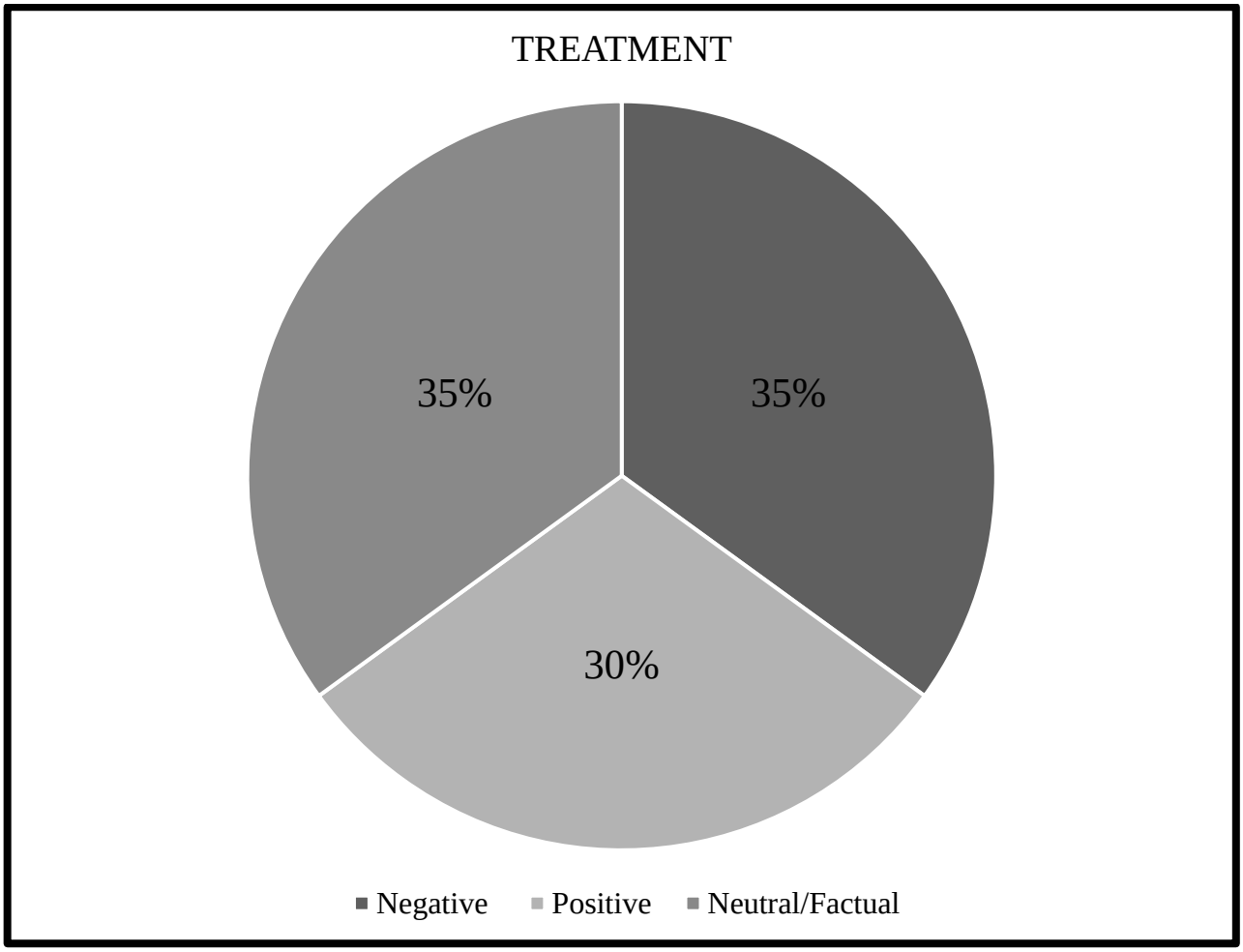

Figure 16: Treatment

As discussed in Chapter 2, the treatment of the message is important. Journalists commonly use a technique called *framing* to encode the message. If the message is framed in a

confusing, misleading, or negative way or incorrectly (completely or in part), it is possible the message will not be received correctly. The framing begins at the headline. Highly negative or positive language is used in an attention-seeking way. While the goal is to grab the attention of the reader to draw them in, this can set the stage for potential nutrition confusion from the very beginning. There are two key effects to discuss: 1) the headline may not match the content of the article and 2) it can deter someone from reading an article that they do not believe aligns with their views, limiting their exposure to all sides of the debate. The research is mixed on the impacts to nutrition confusion when someone is provided both sides of a debate. This is an area for further research, as will be discussed in Chapter 5.

First, the empirical literature provides an interesting perspective on the headline not matching the content. Katz et al. (2018) state the following:

> Importantly, the fundamentals of a health-promoting lifestyle and diet across the expanse of this diverse literature are remarkably consistent. This consistency provides a strong basis for policy and public health practice but is obscured by the interplay of ongoing scientific inquiry, and pop-culture fascination with diet in particular. A news cycle that does not feature hyperbolic headlines about diet is a rarity. (p. 1453)

This discussion builds on work by Basu and Hogard (2008) that first defined the mismatch between headlines and content, in which they found that "headlines were inconsistent with the true nature of the original research reported" (p. 1127).

Second, the headline could potentially deter a reader. The more recently defined term *echo chamber* refers to a phenomenon in which people receive exposure only to either their own opinions or the opinions of those who are like-minded (Stibel, 2018). This could be in the form of only reading articles from specific news sources, based on content or perceived political

affiliations, and so on. Interestingly, the political leaning of the publications did not seem to affect the outcome of the articles. Ideological placement (i.e., potential for bias ratings) was triangulated from multiple sources to ensure accuracy. A Pew Research Center report on political polarization and media habits provided rich data for this dissertation (Mitchell et al., 2014). Similar data on partisan bias were pulled from a scientific analysis done by AllSides (2019). Political bias was also confirmed via MediaBias/FactCheck (2022), a comprehensive media bias resource. Figure 17 and Figure 18 illustrate the ideology of major news sources. The Republican administration led this process in 2020. The commentary and tone in the popular press, as described above, was equally negative and positive from across the spectrum of news sources. This became something to explore in Research Question 2, as described in the next section.

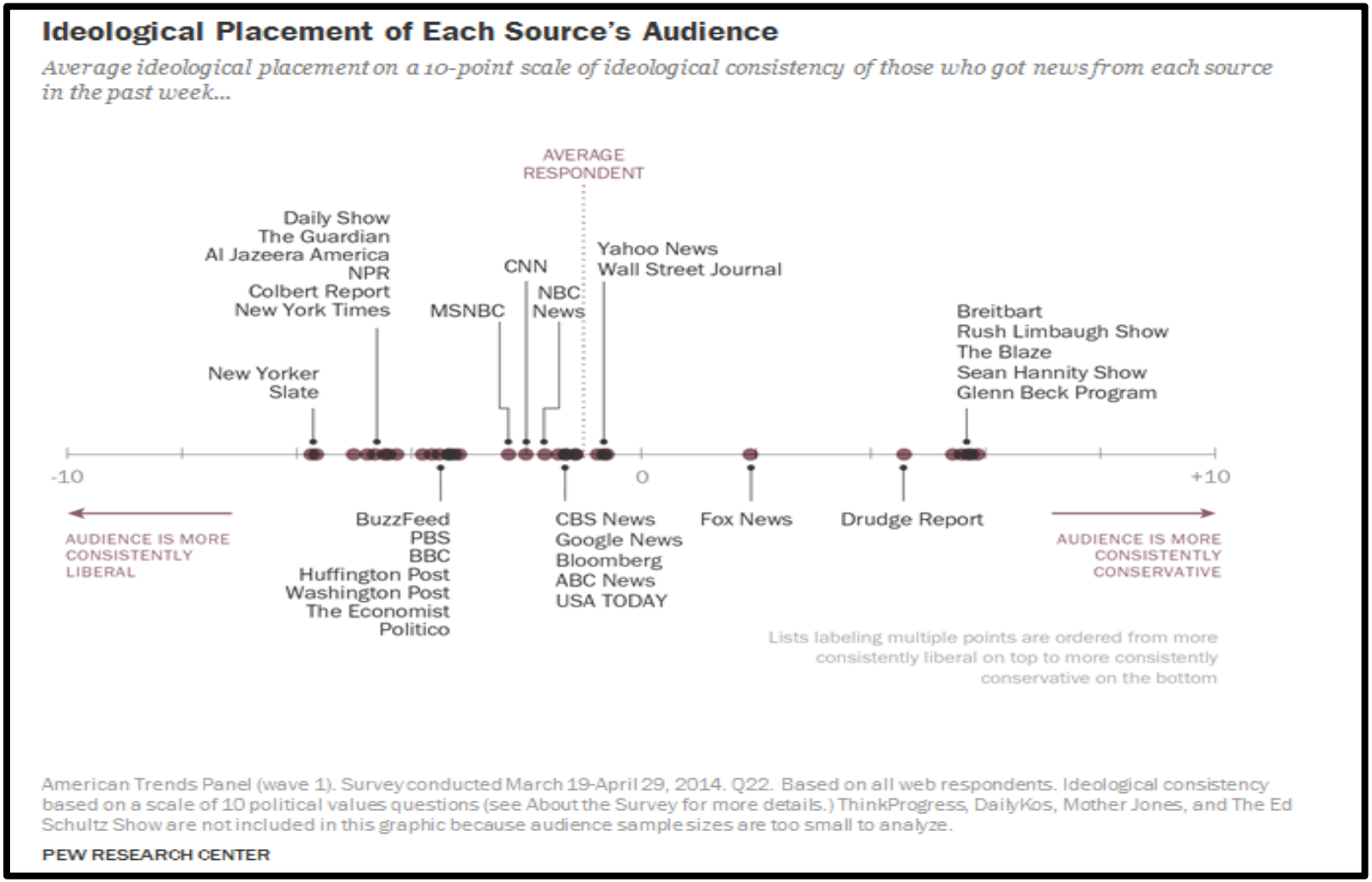

Figure 17: Ideological Placement of Each Source's Audience

Source. Mitchell et al. (2014).

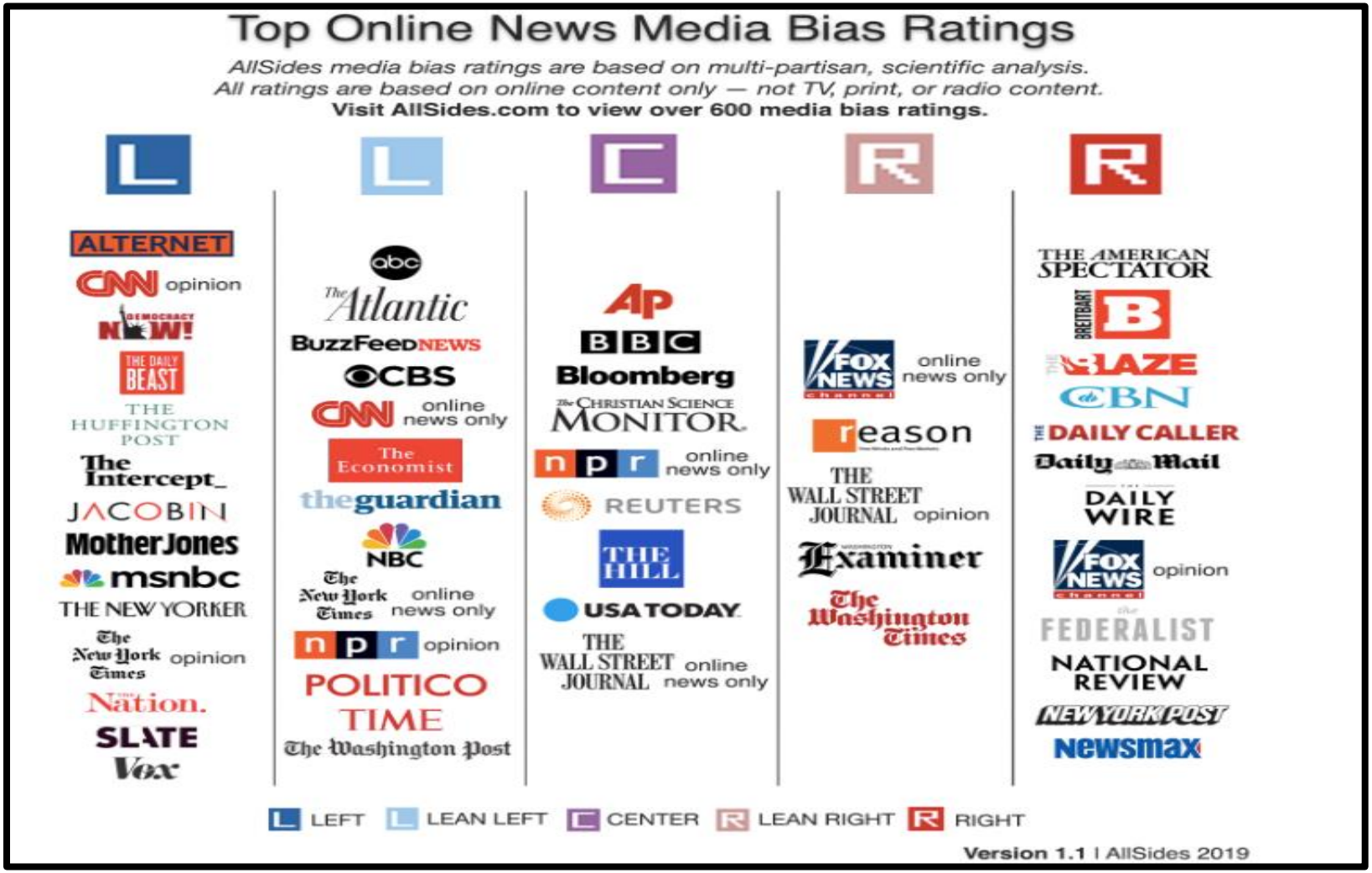

Figure 18: Top Online News Media Bias Ratings

Source. AllSides (2019).

Structure

Analysis showed an almost even split between authors reporting on multiple topics as compared to authors only discussing one key topic area when reporting on the DGA (45% versus 55% respectively). However, even in articles that delved into multiple topic areas, only five used subheadings to guide the audience through the article—even the longer articles. Overall, only six articles used subheadings and those articles included both single and multitopic articles (one article used subheadings even though it covered only one topic). Interestingly, the headings and subheadings, when used, did not always match the content. For example, one article that was highly educational maintained a neutral tone (very factually based) and presented several key topics from the DGA, but it used a heading that was very focused on the controversial piece of the guidelines (added sugars). Instead of focusing on the message that would follow, the heading exclaimed, "No candy, cake for kids under 2" (Johnson, 2020). While the DGA did, in fact, recommend no added sugars for those younger than age 2, the content of the article was not focused on candy, cake, or the under 2 population. Added sugars were covered within the article, as was a large variety of other information from the DGA. This is an example of the phenomenon described by Basu and Hogard (2008), Kininmonth et al. (2017), and Katz et al. (2018). Overall, considering the goal of increasing understanding and decreasing nutrition confusion, more use of subheadings could prove valuable to allow the reader to logically follow the flow of information. Headings should also match the content. Based on the findings of Research Question 1, which mimic the limited empirical literature on this topic, headlines became something to explore in Research Question 2, as described in the next section.

Research Question 1 Summary

Overall, the articles were very mixed in terms of elements, treatment, context, and structure. This mimicked the empirical evidence as discussed in the previous sections and Chapter 2. The media surrounding the DGA release talked about their wide impact and how many U.S. policies were to be based on this information, but the articles also discussed how this information was controversial and missing critical science. Within the articles, there was minimal context provided that would explain these, often inflammatory, statements. The media largely said the DGA were actionable, but most articles failed to report on the actions individuals needed to take to shift to a healthier dietary pattern; instead, they referred readers to a document that is written to be translated by professionals, not used by the general public. Given all of this and based on this singular case study, the findings suggest that communication to the general public about the DGA through the content provided by the media is inadequate overall and potentially contributes to greater nutrition confusion instead of dissipating it. Critical literature in this field by Clark et al. (2019) provides empirical evidence that nutrition confusion could be fueled by media, especially "contradictory nutrition information." I concluded through this case study that depending on which article was viewed, readers could walk away with very different opinions of the DGA. Additionally, if more than one article was viewed by the same person, there exists a likelihood of viewing contradictory information. Given the discussed expert opinions and findings of this research that nutrition communications may be contributing to nutrition confusion, it can be concluded that knowledge translation in nutrition needs to become more effective. To propose the best potential methods for increasing the efficacy of translation of nutrition research to the general public, I must first try to understand why there is an issue. That

is the next step in this research, postulating the mechanisms that contributed to the way nutrition science was translated.

Research Question 2

This research uses a critical realist paradigm to assess the *how* and *why* of nutrition translation in the media to add to the research base on nutrition confusion. To get these answers, I must understand that **the contexts + the mechanisms = the outcomes**. At this point, both the contexts and outcomes are known, as identified through Research Question 1. To answer Research Question 2 ("What are the mechanisms that contribute to the translation of nutrition research in the news media?"), analysis for this question began with Step 3 of the methodology based in critical realism (retroduction), while using the data collected in Steps 1 and 2 to postulate the possible mechanisms. As mentioned previously, Mingers et al. (2013) use a formula to describe critical realism that can help elucidate the critical concepts used to explore Research Question 2, known as the DREI method: **D**escribe the events of interest, **R**etroduce the explanatory mechanisms, **E**liminate the false hypotheses, and **I**dentify the correct mechanisms. The events have been thoroughly described through the findings of Research Question 1, so the next steps include retroducing and identifying the correct mechanisms.

Initial Retroduction of Mechanisms

As defined in Chapter 2, retroduction is the process of combining the data in unique ways until plausible mechanisms can be observed. The process of retroduction involves hypothesizing mechanisms that can be observed from the data explaining the contexts and outcomes, since the mechanisms are not inherently obvious or explicit (Vincent & Wapshott, 2014). To do this work, I started with the literature. The literature on nutrition confusion begins with a discussion of the headlines. In this literature review, my observations agreed with Basu and Hogard (2008), who

found that “the headlines were inconsistent with the true nature of the original research reported.” Likewise, Kininmonth et al. (2017) acknowledge that “journalists must make the story ‘eye-catching’ and ‘appealing’ for the public” but this can lead to “sensationalist reporting or alarmist headlines” (p. 6). Additionally, Katz et al. (2018) stated that “a news cycle that does not feature hyperbolic headlines about diet is a rarity” (p. 1453). Taking this information into account, I used theoretical sampling to group the articles based on their headlines. Theoretical sampling is commonly used in theory building work, so it is appropriate and useful for the postulation of mechanisms. Qualitative research is characterized by this type of sampling because it allows for work that captures both similarities and differences among the sample to derive theory from the data (Conlon et al., 2020). That is the essence of this critical realism case study; developing testable hypotheses based on a critical realism ontology of retroductive reasoning. I first compared and contrasted the context and outcomes as the basis for generating a theory (or theories) about the mechanism(s), which results in testable hypotheses to guide future translational research.

Although I was familiar with the articles, I aimed to take a fresh look at just the headlines, disassociated from the article content. Using the full list of articles (see Chapter 3), I sorted them based on headlines alone. I settled on two groups: those focused on the government action (government rejects, or some expert group disappointed by action, etc.) and those focused on the food and/or dietary implications. I began with this dichotomy because I noticed an immediate emerging pattern of focus on government action. I was curious as to how this grouping may elucidate differences in the message. As a reminder, when considering the structure in Research Question 1, the headlines did not always follow the content. I wanted to review this specific dichotomy to see if this pattern continued to emerge. This was challenging

because the headlines themselves are short and usually not complete sentences. I operationalized this task by focusing on the words in the headline. If the headline content talked about the government, the administration, the action of the DGA being released, or how a group felt about the release (i.e., applauds, rejects, or ignores), it was grouped as government action focused. If the headline content focused on the action of the dietary changes (or what not to change), the impact to the reader (i.e., what this means for them), or a food item (i.e., potatoes, dairy, added sugars, etc.), it was grouped as dietary focused. I settled on the following initial grouping:

Government Action Focused

1. New U.S. Dietary Guidelines reject recommendation to cut sugar, alcohol intake
2. Trump administration rejects stricter advice on alcohol, added sugars
3. Trump administration keeps dietary guidelines on sugar, alcohol
4. US government rejects scientific advisors' recommendations on alcohol and sugar consumption
5. Physicians committee faults new dietary guidelines for racial bias, calls for guidelines to be redrafted
6. Experts ‘disappointed’ over new US diet guidelines on sugar, alcohol intake limits
7. U.S. diet guidelines sidestep scientific advice to cut sugar and alcohol
8. New Dietary Guidelines for Americans ignore recommendations on sugar, alcohol
9. USDA, HHS reject sugar, alcohol cuts in updated dietary guidelines
10. The meat industry rails against new dietary guidelines for only mentioning 'beef' 5 times as the US promotes plant-based protein
11. Gerber® applauds inclusion of birth to 24 month recommendations in the 2020-2025 Dietary Guidelines for Americans

Dietary Focused

1. New US dietary guidelines: No candy, cake for kids under 2
2. 5 ways the US government just changed its recommendations for what you should (and shouldn't) be eating
3. USDA releases new dietary guidelines: What do they mean for you?
4. New US dietary guidelines don't reduce sugar and alcohol intake
5. 2020–2025 Dietary Guidelines for Americans recommend grains at all life stages, maintains existing serving size for whole and enriched grains
6. Dietary guidelines published without changes to added sugars or alcohol recommendations
7. Dietary guidelines reinforce dairy's role in healthy dietary patterns
8. Make every bite count with potatoes
9. New Dietary Guidelines for Americans recommend eggs for the nutrition babies need for brain development

This reorganization elucidated a few things. The government action–focused popular press articles were really focused on what the government was doing. For example, these articles contained many quotes from external audiences focused on what the government did right or wrong versus a focus on what the recommendations were. Many articles included information around the act that happened, whether related to nutrition and dietary guidance, or the DGA itself. Overall, the government action–focused popular press articles were much more centered on the alcohol and added sugars topics of controversy, while the dietary-focused articles were more variable in topic. The dietary-focused popular press articles also covered alcohol and added sugars, however. As a theme from Research Question 1, these controversies were discussed in

most articles across the sample, but the dietary-focused popular press articles also included more articles that were educational and included more actionable advice on other dietary components.

I also noticed that two headlines were specific to the "Trump administration" instead of the government holistically. So, I decided to take a closer look at these two and why they may have been so much more specific in their headline. These two articles were from politically focused outlets, *Politico* and *Bloomberg*. A line could be drawn to these two outlets trying to attract their politically focused readers by using the administration and the president by name in the headline. It is less likely that their readership would be interested in the DGA unless they work in food policy, agriculture, or some other related special interest. To draw their readers in, these articles use the president's name to make it more of an executive branch–focused article, potentially to get larger readership. Of note, one of these articles was very positive toward the government action, affirming the DGA, while the other was negative. They both used a two-side debate format. Interestingly, one other media outlet that is very politically focused, *The Hill* (Kelley, 2020), did not use the Trump name in the headline. Whereas *Politico* and *Bloomberg* report on the government as a whole, *The Hill* tends to be more focused on (in readership and topics) Congress. Therefore, it makes sense that the government as a whole was perceived to incite more clicks for *The Hill*'s readership compared with using the president's name like the other two outlets did.

Meanwhile, the dietary action–focused articles were targeted toward the reader and what steps they could take. For example, the article in *Business Insider*, titled "5 ways the US government just changed its recommendations for what you should (and shouldn't) be eating," was positive in tone and included a lot of relevant information for the reader (Leonard, 2020). It covered multiple topics and provided both context around the guidelines, including details on

why changes may have been made, and the history of the evolution of the DGA. The article also summarized actionable advice for the different topics touched upon. It provided a holistic snapshot of dietary action that an individual could utilize to improve health and prevent disease, while including critical details on why.

Based on the findings around tone, I decided that a second dichotomy could provide a different view of the articles. I looked at the headlines again, this time based on tone alone. I operationalized how I looked at tone in Research Question 1 and used this same definition. I then sorted the articles by negative-tone and positive-tone headlines, grouped as follows:

Negative-Tone Headlines

1. New U.S. dietary guidelines reject recommendation to cut sugar, alcohol intake
2. Trump administration rejects stricter advice on alcohol, added sugars
3. US government rejects scientific advisors' recommendations on alcohol and sugar consumption
4. Physicians committee faults new dietary guidelines for racial bias, calls for guidelines to be redrafted
5. Experts ‘disappointed’ over new US diet guidelines on sugar, alcohol intake limits
6. U.S. diet guidelines sidestep scientific advice to cut sugar and alcohol
7. New Dietary Guidelines for Americans ignore recommendations on sugar, alcohol
8. USDA, HHS reject sugar, alcohol cuts in updated dietary guidelines
9. The meat industry rails against new dietary guidelines for only mentioning 'beef' 5 times as the US promotes plant-based protein
10. New US dietary guidelines: No candy, cake for kids under 2
11. New US dietary guidelines don't reduce sugar and alcohol intake

Positive-Tone Headlines

1. 5 ways the US government just changed its recommendations for what you should (and shouldn't) be eating
2. Gerber® applauds inclusion of birth to 24 month recommendations in the 2020-2025 Dietary Guidelines for Americans
3. Trump administration keeps dietary guidelines on sugar, alcohol
4. USDA releases new dietary guidelines: What do they mean for you?
5. 2020–2025 Dietary Guidelines for Americans recommend grains at all life stages, maintains existing serving size for whole and enriched grains
6. Dietary guidelines published without changes to added sugars or alcohol recommendations
7. Dietary guidelines reinforce dairy's role in healthy dietary patterns
8. Make every bite count with potatoes
9. New Dietary Guidelines for Americans recommend eggs for the nutrition babies need for brain development

Interestingly, when going from government focused and dietary action focused to negative tone and positive tone, very few articles changed lists. This indicates a clear correlation between government-focused articles being more negative in tone and dietary action–focused articles being more positive in tone. In fact, only one government-focused article moved to the positive-tone list: the article in *Bloomberg* titled "Trump administration keeps dietary guidelines on sugar, alcohol" (Hirtzer, 2020). One article moved from the dietary-focused group to the negative-tone group: "New US dietary guidelines: No candy, cake for kids under 2" (Johnson, 2020). What is most interesting about this article is that the headline seemed to be very off-topic

for the article itself. It was more of a conglomeration of the multiple topics in the article, written in a way that attempted to garner attention from the audience. This article presented many of the key topics from the guidelines (guidance for infants, toddlers, moms, alcohol, and men) and discussed MyPlate advice. It presented the information factually, providing education to the readership and expert quotes and avoiding the political nature of the DGA.

In taking a different look at the lists as separated by tone, another pattern emerged. Articles that were more positive in tone also tended to be more focused on education. The Associated Press article with the headline "New US dietary guidelines: No candy, cake for kids under 2" (Johnson, 2020) was an outlier. As discussed in the findings for Research Question 1, the placed articles tended to offer more actionable advice and to be more educational, and they did this via pulling more direct text from the DGA. Of the six placed articles, five were identified in the positive-tone grouping above, meaning they also tended to have more positive headlines. These findings were critical to the retroduction of mechanisms as described below.

Analysis revealed that regardless of the group or restructuring, the headlines all promoted "clicks." Headlines seemed to be written specifically to get the attention of the readership, sometimes obscuring the message to do so. The article by Johnson (2020) is one example of this tendency. If you are interested in food or nutrition, these headlines could make you want to read the article. On the other hand, if it was a more government-focused outlet, the headlines were more focused on the government or the administration, specifically. A closer look revealed that the headlines did not always mimic the content of the articles. This mimics the empirical literature on this topic, as discussed in Chapter 2. If the headline was written more to get the click, the article then followed with the content of importance and that would most likely engage the reader. Consider the article by *CNN.com* by Strickland (2020) titled "New US dietary

guidelines don't reduce sugar and alcohol intake." This headline seems to indicate the article will be about sugar and alcohol recommendations, but it covers much more. Alcohol and added sugars recommendations were, arguably, one of the most publicized and controversial parts of the guidelines. This article harnesses that public interest in the title but then talks about the facts surrounding these two recommendations. It provides both sides of the debate, allowing the reader to make their own fact-based decisions. It further provides information on the new guidelines for babies and toddlers and many of the other recommendations, grouped as "broad recommendations" by the journalist. Similarly, the article by Johnson (2020) ("New US dietary guidelines: No candy, cake for kids under 2") had significantly different substance than the candy and cake mentioned in the title; it covered a wide variety of topics in a factual way. Even the *Politico* article by Bottemiller Evich (2020) focused on the Trump administration moved into some additional information after garnering the attention of the reader in the headline and first paragraph, which was focused on the controversy. These headlines were seemingly skewed or developed to portray something as more controversial than the actual content discussed in the article. In many cases, the headlines appeared to be much more exaggerated in tone than the rest of the article.

Considering this information, I postulated two mechanisms that potentially contribute to the translation of nutrition science by news media sources:

1. Headlines in the news media are likely to be worded to garner clicks/views, regardless of the content found within the article.
2. Journalistic media (i.e., media written for publication by a trade journalist) tends to be more subjective, including more use of framing techniques and context, while placed articles (i.e., an article written for publication by a non-journalist, industry expert, or

public relations specialist on behalf of an interest group) tend to be more objective to attempt to preemptively combat assumed conflict of interest.

The hypotheses developed need to be questioned for fit by asking the following: "Does hypothesis A, B, or C 'fit' as a mechanism that would explain why the outcomes were the outcomes?" Literature, archival documentation of external surveys, and historical analyses were used (in Chapter 2) to assist with developing the hypothesized causal connections discovered via Research Question 2. For example, the literature on headlines led to my theoretical sampling based on headlines. The next step after identifying the initial mechanisms was to determine whether they are the correct ones. To do that, I used the methods described as Step 4 (see Chapter 3) to empirically corroborate the two postulated mechanisms.

Empirical Corroboration

Empirical corroboration is the last "step" in analyzing for the possible causal explanations in a certain case study. Triangulation of data sources adds to the trustworthiness of qualitative research, and empirical corroboration is a method of triangulation. Per the suggestion of my committee members during the proposal defense, an anonymized interview with an expert in the field was conducted to specifically discuss the findings of Research Question 2. As described in Chapter 2, I chose an expert that had experience in both media work and nutrition science. This person is someone I have worked with in the past and was able to spare 30 minutes for this project under the promise of anonymity. This person was not regarded as a human subject and participated anonymously to provide an expert opinion that could triangulate the findings of my research via the method of empirical corroboration. Empirical corroboration is about verifying the validity and reliability of findings and is an important part of critical realist theory building work.

As found in the Interview Guide in Appendix A and as described in Chapter 3, I began by asking with some broad questions, narrowed to more specific questions, and ended with open-ended questions. The goal was to corroborate findings and ensure there were not unidentified gaps. I also wanted to understand whether there were areas in which I should dig deeper. This person is an expert in the field of nutrition science and has extensive expertise working with the media. The conversation provided me with a deeper understanding of how it can be challenging to get an article placed in a major publication without a click-worthy title and subject. This corroborated the proposed mechanism around the headline being an important aspect that is worded specifically for clicks. My interviewee talked about the way they commonly write articles, saying they will grab the audience's attention with the title and first paragraph and then try to incorporate the scientific information further down once they have the audience's attention. This can be seen in our research sample. For example, take the *CNN* article by Strickland (2020) discussed earlier, titled "New US dietary guidelines don't reduce sugar and alcohol intake." This article starts with a headline and a discussion around the alcohol and added sugars controversies and then moves into different factual information on the DGA. A similar pattern was also seen in other articles, such as the *Politico* article by Bottemiller Evich (2020) described earlier. This corroborates the findings of the first hypothesis: that headlines in the news media are likely to be skewed in a way that will garner clicks/views, regardless of the content found within the article. In many cases, the headlines appeared to be much more exaggerated in tone than the rest of the article.

During the expert interview, we also talked about the second postulated mechanism—that journalistic media tends to be more subjective, including more use of framing techniques and context, while placed articles tend to be more objective to attempt to preemptively combat

assumed conflicts of interest. My expert interviewee corroborated that this is a commonly seen phenomenon. We discussed the scientific justification behind the controversies in 2020 and the scientific nuance behind the expert opinion versus the scientific base that comprised these controversies. The interviewee also recalled times that an interest group had made an introduction to a media outlet and, even as an independent scientist, they felt more highly scrutinized and a need to be more objective in any comments provided. This relates back to the literature on conflicts of interest as discussed in Chapter 2. Interest groups can be considered those with a vested interest in an outcome. Interest groups are of critical concern, given that they have a particular stake in the subject area and, potentially, something to gain. As described by Kingdon (1984), this could include the food industry, public health organizations, other NGOs, advocacy groups, agricultural commodity groups, and research organizations, among others. All of these groups employ lobbyists and have something to gain from nutrition research coming out in their favor. If these are the people introducing a chosen expert, that expert may also be more scrutinized. However, there are systems in place to manage conflicts of interest (transparency, funding declarations, and so on, as discussed previously) and provided that these are employed properly, this heightened concern should be mitigated and critical thinking should be used.

Ultimately, the interview with an expert corroborated my initial findings, and the discussion shed additional light as to the true cause behind the causal mechanisms found initially. There was an additional, even more overarching mechanism found: the effects of money. The discussion shed light on how this issue can influence decisions across the many groups involved in this work. For example, the interviewee, when asked about what else I should consider, brought financial incentives to my attention. The interviewee made the point that money can come from anywhere—not just industry, but also advocacy groups and other special

interest groups. This led me back to the literature to review the data and triangulate my findings with data on conflicts of interest, such as financial incentives. I determined I needed to go back through the retroduction phase and see if the original hypotheses (which were corroborated) continued to hold when coupled with a deeper, overarching mechanism of financial incentives, as discussed next.

Further Retroduction and Empirical Corroboration of the Mechanisms

As defined in Chapter 2, critical realism is an iterative method. As stated above, my discussions with an expert to corroborate my findings led to a new potential overarching mechanism that needed to be fully analyzed using retroductive reasoning and then empirically corroborated. Financial incentives was determined to be a mechanism that overarches the mechanisms initially postulated. Financial incentives are a common conflict of interest that people are aware needs to be managed, but the management is challenging at best. Per my expert interview, it is important to acknowledge that money is everywhere. My interviewee talked about the media being biased, too, because they need to sell ads and newspapers and make money through gaining readership. The interview corroborated the concepts found during my literature review: that there are constantly changing headlines (one week something is good for you, the next week it is bad, or vice versa) but the underlying research is seldom as dichotomous. These headlines garner attention, which garners clicks, which garners money for the outlet and thus allows its survival. However, these headlines also can lead to confusion, especially if consumers are hearing dietary advice one week and then the advice changes the next week. In the interview, we discussed that these financial incentives could affect all groups, not just the media.

Taking this into account, I went back to the literature to better understand the scientific evidence on conflicts of interest and financial incentives. There is literature looking specifically

at the food industry as well as the scientific evidence that is funded by the food industry, stating that it is at risk of bias. For example, the evidence base shows that work sponsored by the food industry may be "skewed" toward solutions that are in the interest of the industry sponsor (Fabbri et al., 2018) or is disproportionately skewed toward the positive (Rao, 2022). Importantly, neither study indicates that the research undertaken is itself flawed but rather that the industry may be risk adverse, funding work that they believe will be positive toward their chosen commodity. This has been hypothesized by experts and could be an implication for future research. In this case, I am not specifically concerned with the research that is or is not funded by interest groups. This case study is about the attitudes and how financial incentives may contribute to the way nutrition science is *translated* by the media and, per the expert interview, money is an overarching issue across all, including interest groups and the media.

As documented by the Pew Research Center and discussed earlier in this work, newspaper subscriptions have seen massive declines over the past decades, peaking in the 1990s and steadily diminishing year over year. With the advent of the internet, many subscriptions moved to digital format. Although gauging digital circulation poses challenges, recent research estimates that digital subscriptions have risen, but "the estimated total U.S. daily newspaper circulation (print and digital combined) in 2020 was still down 6% from the previous year" (Pew Research Center, 2021). To find revenue in this gap, some newer news sources have begun to test business models such as paying writers per click. However, the conflicts in this are clear. As noted in the *Columbia Journalism Review*, "detractors claim it has, at times, failed journalism and its practitioners" (Murtha, 2015). This is a similar issue with paywall articles. As media institutions are fighting to regain market share, the journalist needs to provide an enticing headline to get the click and the pay-per-view or pay-for-subscription from the potential reader.

This was a topic of discussion during my expert interview. My interviewee talked about their experience with this exact phenomenon. They have significant experience writing for high-profile media outlets but have found they have to have an angle that people have interest in to get the articles picked up. Even if it is highly impactful nutrition information, it may not get published if it is not exciting. This is interesting in that it suggests something must be new or different to be "clickable." If nutrition research is only translated into "clickable" information, it will continue to be seen as new or constantly changing, by definition, contributing to nutrition confusion.

Using the *Politico* example titled "Trump administration rejects stricter advice on alcohol, added sugars," I can see this exact pattern (Bottemiller Evich, 2020). The journalist used a controversial title and spoke to that great debate first, which grips and holds the audience's attention to get the click, keep them on the page for ad space, and only then move on to other topics once they finish the article. In doing so, the writer can provide more thorough reporting within the remainder of the article, hopefully holding readers' attention. Consumers are typically interested in the controversy. Based on the expert corroboration, the literature, and the examples seen in our sample, the need to ensure that money is captured from the marketplace motivates attention-grabbing headlines. Financial incentives may be in the form of subscriptions via a pay-wall or through ad views, but the key is to garner clicks/views.

When looking at the second hypothesis postulated initially ("journalistic media tends to be more subjective, including more use of framing techniques and context, while placed articles tend to be more objective to attempt to preemptively combat assumed conflict of interest"), there is an even more obvious direct line drawn. As discussed, the media aims to get people interested in the content and keep them engaged. The articles are more subjective in nature, and they use

expert opinion, framing techniques, and tone to elicit emotion. My expert corroborated this with an example, stating there have been many times they have had to stand up to publishers, editors, or producers when working to communicate nutrition science in the media because the media outlet wants to be too provocative—going too far, losing meaning, or potentially leading to confusion. Counter to this, those who already have a perceived conflict of interest need to be more objective from the forefront to be believed. They need to state upfront potential conflicts of interest and then need to be straightforward. This was corroborated during my interview as well. This directly correlates with the second hypothesis postulated. Interest groups are incentivized to publish work that advocates for their cause, ultimately leading to more money coming back to their interest.

Research Question 2 Summary

Overall, two mechanisms were found to fit in answering Research Question 2. The research question asked what are the mechanisms that contribute to the translation of nutrition research in the news media? Two mechanisms were initially found and corroborated:

1. Headlines in the news media are likely to be worded to garner clicks/views, regardless of the content found within the article.
2. Journalistic media tends to be more subjective, including more use of framing techniques and context, while placed articles tend to be more objective to attempt to preemptively combat assumed conflict of interest.

In addition to these two mechanisms, there was an overarching mechanism found regarding the role of financial incentives driving these mechanisms. There are financial incentives that cause publications to focus on publishing headlines that are worded to get clicks, subscriptions, and ad money. There are financial incentives for the journalist to use these framing techniques and

context and be more generalized in their readership. Finally, there are financial incentives that drive interest groups to publish work that advocates for their interest, but this work tends to be more objectively written to avoid perceptions of conflicts of interest. This does not distinguish from the need for "clickability," however. These articles, while more objective in nature, must still garner interest of the readership, likely continuing to suggest that nutrition science is constantly new or changing, and likely leading to nutrition confusion.

Summary

This chapter presented the qualitative findings of the two research questions addressed in this study. The DGA is nutrition research that is written for a professional audience and the U.S. government is therefore relying on translation of this information by professionals (such as health and communications professionals). This translation needs to be done in a way that enhances understanding across the general population. However, the findings in this most recent case display that the media did not adequately translate the nutrition research to the masses in a way that would lower nutrition confusion and increase nutrition understanding. Instead, these articles were so heavily variable that there is increased concern of nutrition confusion after their release. The variability in tone and content likely contributed to perceptions of government inadequacy, missing information, and scientific controversy—as defined by the research, this leads to nutrition confusion and nutrition backlash in the general public (Clark et al., 2019; Lee et al., 2018). Most articles were not educational to the reader, nor did they provide the actionable advice from the DGA that the government is relying on professionals to translate. Research Question 2 allowed me to better understand why this may be the case. It was determined that the news article headlines were provocative in nature, not necessarily mimicking the content of the article, and the journalist-driven articles were more subjective and tonal compared to the

objectivity seen in most placed articles. The critical overarching mechanism to this case is the financial incentive associated with being provocative, appealing to a wide audience, and ultimately garnering clicks or interest in the special interest being advocated for by interest groups placing articles. These findings were corroborated by an expert in the field and the literature. Chapter 5 presents the conclusions of this case study and elaborates on recommendations for future research.

CHAPTER 5: DISCUSSION

Summary of the Key Findings

Nutrition is a key to overall health and wellness, and the DGA is the primary piece of nutrition advice in the United States. The news media has become a primary source for nutrition information, yet a majority of Americans view the nutrition news they read as inconsistent and confusing (IFIC, 2006, 2011, 2017). Unfortunately, this leads to larger problems, as nutrition confusion has been causally linked to "nutrition backlash," which is the complete disregard for even the most strongly supported nutrition advice such as the health benefits of consumption of fruits and vegetables (Clark et al., 2019; Lee et al., 2018). To understand the role of print news media in nutrition confusion and the mechanisms behind how nutrition research is translated to the public in the news media, this research used the release of the DGA, 2020-2025 as a case study for assessment. Two research questions were posed:

1. How does the news media translate nutrition research?
2. What are the mechanisms that contribute to the translation of nutrition research in the news media?

Two study aims are associated with these research questions. Aim 1 was to describe the translation of nutrition research into digital print news media and generate an explanation about how nutrition research is translated to the general public. Aim 2 used these findings to generate a theory of the causal mechanisms contributing to the translation of nutrition research. These research questions were explored via a critical realism lens, as originally developed by Roy Bhaskar (1978), joining realism with subjectivism to view the problem. Methodologies derived

from critical realism, including abstraction of the outcomes via RTA, retroductive reasoning, and empirical corroboration, were used iteratively to view the stratified domains of critical realism and create new theories about the causal mechanisms that generated the level of translation found in this case. Put simply, use of critical realism via a qualitative case study allowed me to explore and clearly and concisely explain an empirically derived causation, corroborated via triangulation with the literature and an expert interview. Given the translational nature of this research, I will be able to use these findings to develop recommendations for the government to push the media to translate future dietary guidance in a way that will enhance nutrition understanding.

The release of the DGA provides a holistic view, through a succinct case, of how and why nutrition science is translated in the print news media. The themes organizing the news media's translation of the DGA (released December 29, 2020) portrayed the DGA as actionable advice that has a wide-reaching impact on all life stages, but also conveyed that the DGA is inaccurate, incomplete, controversial, and (potentially) scientifically unsound. This research set out to determine each piece of the equation: **the contexts + the mechanisms = the outcomes**, which encompasses the complexity of the stratified realities of a critical realism lens.

The Contexts + The Mechanisms = The Outcomes

The context, the state of the Actual Domain, largely consists of the content of the DGA upon release. What is the true reality of the nutrition research? Although complex, the reality of nutrition science is that it remains relatively unchanged year over year, edition over edition. Shifting to a healthy dietary pattern, as described in the DGA, will help promote health and prevent disease. While there were some nuanced scientific disagreements within the expert body

providing recommendations to the government, when taken as a whole, a healthy dietary pattern includes food and beverage choices that

- reflect personal preferences, cultural traditions, and budgetary considerations;
- meet food group needs with nutrient-dense foods and beverages;
- stay within calorie limits;
- discourage foods and beverages higher in added sugars, saturated fat, and sodium; and
- limit alcoholic beverages.

This context, in combination with the mechanism of action, represents how the event was experienced (Empirical Domain), which are the outcomes. The overarching mechanism found in this case was the power of financial incentives. It was hypothesized through this research that those financial incentives likely affect the media translation of nutrition research. This happens for several reasons. First, due to a need for media outlets and authors to make money, there is a financial incentive to tell the story in a very compelling way. The monetary benefit to the media comes in a few forms, each dependent on a click of the link to open the article. This means the headline must be provocative and attention-grabbing in nature to elicit reader interest and get the click. Once in the article, the article must hold readers' attention, at least long enough to get metrics of the click for advertisement value. This mechanism of financial incentive due to click rate, coupled with the state of the Actual Domain, leads to the use of mechanisms by the news media on government action, negative tone, controversy, and missing information. It also led to highlighting the newsworthy "firsts" that occurred in this edition of the DGA. While most articles provided the readership with the information that the advice in the DGA was actionable, not as many provided explicit dietary information to the reader.

The power of financial incentives was also reflected in how the articles were written, not just the headline. The articles that were journalistic in nature and provided by a major news outlet for a generalized readership tended to include more external contexts and used more framing techniques. The sample of articles in this study were evenly split between use of positive and negative framing techniques. These articles also tended to include a wider variety of topics, covering a broader swath of information with significantly less actionable detail. Conversely, the articles that were placed by interest groups were heavily concentrated in focus on a singular topic or commodity. Most of these interest group–generated articles were positive in tone and provided more direct educational content (with one exception). These articles were less contextual and included more direct DGA text quotes. It was determined that these two dichotomies were again due to financial incentives, but for different reasons:

1. An effort to gain additional readership, similar in mechanism to the need for clicks; or
2. Potential financial gain from either positive messages around a commodity (eggs, grain, potatoes, etc.) or financial gain for advocacy organizations to counteract existing negative media.

These industry-placed articles were relatively more direct and objective to portray less potential for subjectivity due to conflicts of interest. Either way, the focus was the specific special interest of the group placing the article due to potential ultimate financial gain.

Interpretation of the Findings

The outcomes, ultimately, did not reflect the context. This discrepancy can be traced to one overarching mechanism: financial gain associated with several themes organizing the ways the information was translated. The causal mechanism of *financial incentives* potentially contributes to nutrition confusion, as illustrated in the following scenario. Assuming that an

individual read only one article, there was an equal chance they got a factual one or one that was overly positive and/or negative in tone. Depending on which article they read, this reader could walk away with a highly variable view of the DGA. Even more concerning, should an individual read more articles on this topic, the content was so widely varied in content, elements, treatment, and structure that a reader could get a significantly different message from each article they read. The findings, overall, suggest that few articles comprehensively report the DGA. Instead, the articles focus on factors that may increase the newsworthiness of the release or factors related to external promotion based on internal motives. The outcomes did not represent a comprehensive view of the Actual Domain, but instead provided limited views of the nuanced and highly scientific controversy of narrow topics (such as added sugars or the novelty of the B-24/p aspects of the DGA). This lack of comprehensiveness potentially promotes nutrition confusion.

The findings from this study mimic recent research done in the United States on this topic. Two studies recently suggested that media, both print and broadcast, do lead to both nutrition confusion and nutrition backlash in the United States (Clark et al., 2019; Lee et al., 2018). More concerning, the implications of this have been long standing and problematic, as stated by Nagler and Hornik (2012), citing a robust list of literature on the topic: “there is concern that exposure has negative effects, including increased public confusion, less trust in health recommendations, and less engagement in health behaviors.” This dissertation case study was developed to build upon this literature.

This dissertation helps to fill some important gaps in the literature on the role of nutrition science translation in nutrition confusion. The content of the reporting of nutrition research is a widely understudied gap in the research. A comprehensive literature review found only two studies (both of British media, none within the United States) looking at this line of inquiry.

Since the literature provided evidence of concerns that the media can contribute to nutrition confusion but there was not literature to look specifically at the U.S. print media, that was a critical missing piece that was elucidated by this research. This study found that comprehensiveness is lacking when it comes to translation of nutrition research in the news media. More specifically, there is a focus on topics that can be deemed "newsworthy" or even "provocative" in order to entice reader engagement, as opposed to a focus on translation of the evidence in a meaningful and educational way. When looking at the mechanisms that may cause this gap in translation, the power of financial incentives was substantial, causing the message to be muddied for the reader. These findings, which are in line with the overall research on this topic, support the conclusion that the print news media may be contributing to nutrition confusion. Proposed solutions and implications for future research will be discussed next.

Proposed Solutions and Implications for Future Research

This case study should not be viewed in a vacuum, and numerous considerations for future research were found throughout this work. Although this small case study contributes to closing a gap in the literature, nutrition confusion is a highly complex problem.

The DGA has wide-ranging impact and contains a plethora of conclusive scientific evidence that should not be viewed as inconclusive. In fact, to the contrary, the DGA are "grounded in science" and "focused on public health" (USDA & HHS, 2020a). By law, "the Guidelines must be grounded in the body of scientific and medical knowledge available at that time, not in individual studies or individual expert opinion" (USDA & HHS, 2020a).

Systems in the United States are complex, including government systems, health care systems, and academic systems. The emerging field of translational health science is intended to spur application of basic research to real-world problems, but still this process is slow; in the

health care field, it is estimated to take 17 years to get new scientific evidence from "bench to bedside" (Balas & Boren, 2000; Morris et al., 2011). With translational health science, new emphasis is being placed on the translational aspect of the research being done, requiring more focus on the program theory behind the innovation, the implementation of the innovation, and the evaluation of the process at different time points to provide feedback for adaption and sustainability. This long timeline, however, is a hurdle. The law is clear about the standard, but how does new evidence fit into that standard? In the case of the DGA, the law itself can contribute to this 17-year gap. As seen in the media portrayal of the release, this is a key point of contention as committee members had differing opinions on some specific recommendations—namely, alcohol and added sugars—causing controversy that was heavily covered by the media, ultimately leading to less coverage of the critical dietary advice contained within the document and labeling of the document by some advocacy groups as "incomplete." This type of controversy has also been seen for sodium standards, with new evidence making headlines and the policies remaining based on the preponderance of evidence. While the scientific discussion is important, the fact that it is playing out in the public can be confusing—depicting the very definition of nutrition confusion—and lead to less public trust in the government as a whole. Based on assessment of the three levels of reality as presented in this study, several recommendations can be offered, including those for the next DGA release and for future research.

Recommendations for the Next Dietary Guidelines for Americans Release

Recommendation 1

The government should continuously aspire to increase transparency to the greatest extent possible. A key tenet to combat conflicts of interest that the government upheld

throughout the entire process was transparency. Per the USDA and HHS (2022b), "USDA and HHS took a number of actions to increase transparency between the 2015–2020 and 2020–2025 Dietary Guidelines development cycles"; a list of those actions can still be found on their website. Of course, with more transparency brings more engagement from the public, media, interest groups, and other stakeholders. This was the most active DGA process thus far, with hundreds of thousands of public comments, over 1 million website views, and many news articles covering the work throughout the 5-year process. This level of engagement brought additional scrutiny that played out in the popular press. As explored in this research, over 20 articles were posted on the day of release (including reprints), published on December 29, 2020. These articles included a bevy of newsworthy hot topics such as public distrust in government, nutrition science, sugars, alcohol, sodium, and infant feeding. There is much to perceive as a journalist looking to sell an article or as a news organization looking to make money via clicks on articles or simply trying to keep subscribers happy by turning out new news daily. However, as seen in this case, it was not always shared in a way that would limit or decrease nutrition confusion.

Although transparency was strong throughout the DGA process, there was no widespread embargoed media release because of the sensitive nature of the materials. Journalists can only write about what they know. While there was ample material available on the website and within the DGA, if the goal is to release a news article as quickly as possible, a journalist would likely not be able to read the entire 164-page document and all accompanying materials and publish in a short period of time. As discussed in Chapter 4, while there was some "educational" content in many of the articles, the majority of the information provided was contextual overall. News articles from the release day did not compare well to the DGA text, unless the DGA text was

pulled straight from the document. In some cases, this was the route taken, mostly by interest groups who wanted to share about a specific commodity. These articles had less journalistic flare and typically pulled direct text from the DGA, covering the facts focused on a singular topic that the group intended to promote. While these were the most "educational" articles regarding the DGA in this sample, they once again reflect the mechanism of financial incentive. To reduce the appearance of conflict of interest and increase the appearance of objectivity, these interest groups tended to pull direct text and stay focused on the positive. However, the goal for these groups is to promote the positives of their commodity. There are USDA-monitored research and promotion commodity boards (also known as checkoff programs) and trade associations, the interest groups who placed the articles, whose goal is to promote research and education for specific agricultural commodities. Meanwhile, the media has the goal of getting clicks from all, allowing them to be more subjective and potentially controversial in their writing style. This leads to the dramatic differences in what the public would be able to learn from the media on the DGA. They could read two or three articles released on the same day and gain very different conclusions from each, with only some articles containing translation of the actionable advice found within the DGA. This is very important because the guidelines themselves are written for a professional audience to use as "information to develop programs, policies, and communication for the general public" (HHS, 2022; USDA & HHS, 2022a). The government is relying on professionals (health professionals, educators, policy makers, and even communications professionals) to translate this information to the public. However, based on the findings of this dissertation study, the media's translation of critical nutrition research is likely contributing to more nutrition confusion than less. The articles were inconsistent in tone and content, lacked the

conclusive dietary advice provided, and focused on "newsworthy items" such as controversy and historical, political, and socioeconomic context.

Recommendation 2

Coordinate work between journalists and researchers. A key recommendation would be more coordinated work with the professionals the government is relying on to translate this information to the public, especially the news organizations. The day of release is a major news day when it comes to the DGA—the release every 5 years is the news hook. Although there is ample information online for health professionals and educators to use, collaboration between the government and the media should be a priority to ensure proper translation of the nutrition news to the general public. As is the case with nutrition confusion and nutrition backlash, getting it wrong can have huge unintended consequences down the outcomes chain. This recommendation should be taken in stride by both the government and the news organizations; collaboration is not the sole responsibility of one party or the other. Remaining eyes-wide-open about the goals of each party is key to finding a win-win opportunity. News sources gain revenue from subscriptions and advertising. Consistently using headlines that instill curiosity or provide information on a controversy will ensure more readership and strengthen financial security. However, trustworthy news is also important to keep readership. Being able to cite the USDA can be a key step in showing accuracy. The DGA do not really change much from edition to edition—which is the important message for decreased nutrition confusion. That "nothing changed" headline is not exciting. It is not going to grab readers and garner clicks like the "nothing changed because the government rejected science" headline will. Ensuring that the content within the news source is accurate and actionable would be progress, and the government and news outlets should work toward this goal as a coordinated team. As seen in Chapter 4,

many (80%) of the articles mentioned that the advice in the DGA is actionable, but far fewer provided education (60%) in any form and even fewer (50%) providing key steps of action to take when shifting dietary patterns toward healthier habits (with 50% of these being placed by interest groups). Further, the "actionable advice" provided was most commonly provided in the form of direct text excerpts from the DGA instead of in a translated form that could be digestible by the average consumer. As a reminder, the DGA is written for a professional audience to be translated to the consumer. Increased collaboration between the government and the news entities before release of the DGA could help ensure that the message is correct and more of the actionable advice makes it into the content of the articles, in consumer-friendly forms, providing the public with the needed dietary recommendations.

Recommendations for Future Research

Recommendation 3

Develop and test a Theory of Action. Moving knowledge into action is supported using a program theory. The study research questions were designed with the ultimate translational goal of developing recommendations for change that will contribute to increased health and decreased morbidities and health costs down the outcomes chain. The outcomes chain developed for this research is shown in Figure 19. Recommendations 1 and 2 should be evaluated to ensure that implementation results in positive outcomes down the outcomes change. These can be tested using program theory and common implementation science frameworks.

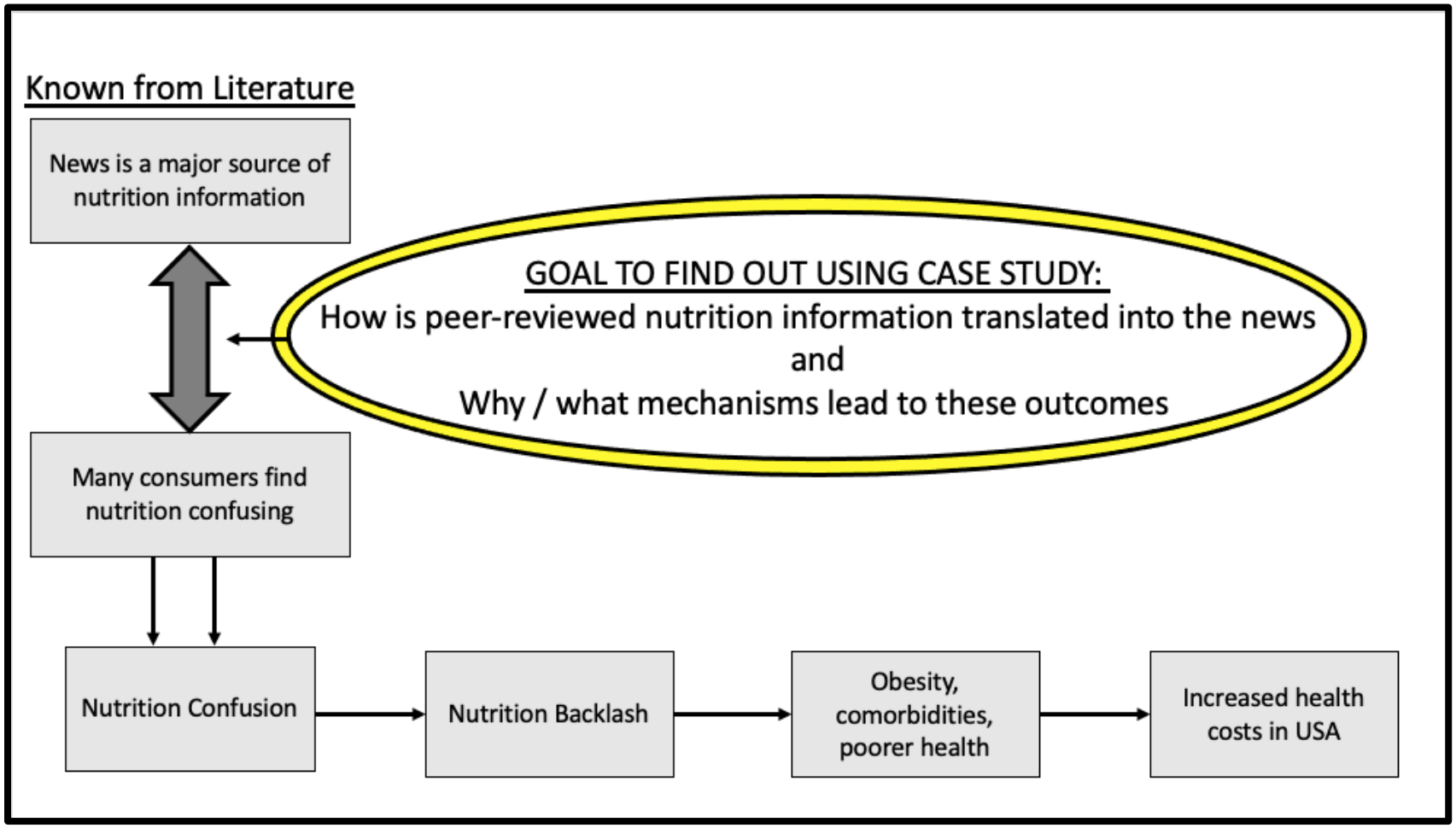

Figure 19: Outcomes Chain

The recommendations developed for government can be tested in future research. As the KTA framework indicates, future research can select and tailor these recommendations to the specific context for testing, evaluate the outcomes, and develop ways to sustain the use of new knowledge. Future research will hopefully use these findings (i.e., the *how* and *why*) to develop and test actionable steps to tackle nutrition confusion.

Additional recommendations for future research were considered throughout the dissertation. In summary, these recommendations include the following:

1. This dissertation looked at the impact of the news articles published on the day of the DGA release. Generally, nutrition is a topic of interest for many in the public, and new articles are consistently in the lay media that may touch upon the DGA. Furthermore, it is expected that more articles were published after the day of the release, in the days and weeks that followed, that could similarly affect nutrition confusion. These other articles could be studied in future research. For example, instead of narrowing to the day of release, perhaps future research could build on these findings by studying a longer time period with a narrower topical focus (i.e., all articles on the DGA and added sugars over the span of a few months compared to this case of all articles on one day covering any and all DGA topics).
2. Similarly, there are other forms of media that could influence readership such as blogs, social media, television, and radio, to name a few. There is a large gap in the literature across all forms of media. This case study took a narrow focus, reviewing the print news media, based on the scientific evidence pointing in that direction (see Chapter 2). Future research could build on this work by reviewing other forms of media and their potential interactions with nutrition confusion.

3. The impact on nutrition confusion when someone is provided both sides of a debate is another area for future research. There are concerns around nutrition confusion when the messages appear to be contradictory across subsequent articles. There is a need for further research exploring how providing the full view (both sides of a debate) in one comprehensive article could affect nutrition confusion.
4. More research on interest groups and their funding is needed. There has been work on food industry funding but based on the mechanism of financial incentives, more work could be done across all interest groups and the media to understand conflicts of interest and implications of financial incentives more deeply.

Further Considerations

Limitations

While this study yielded several interesting findings, several limitations exist. First, this is one single case study. One case provides an in-depth description of a phenomenon rather than a generalizable result. Thus, the findings can only be transferred to other similar situations (cases) for the purposes of verifying and refining conclusions.

Another limitation was the sampling frame, which resulted in a sample of 20 articles published on the day of the DGA release. There were many other articles that came out after the day of the release that could similarly affect nutrition confusion and that could be studied in future research.

Further, limitations associated with the political and social contexts cannot be ignored. December 2020 (and the preceding months) included many news-worthy events and topics that were vying for attention in the press (COVID-19, the U.S. presidential election, civil and social unrest, racial justice conversations, etc.). It is also possible that the immense amount of other

news happening at this time impacted the depth and/or breadth of news about the DGA. Additionally, the DGA were released the week between Christmas and New Year's Day—a time when many people take vacation. Notably, at least one reporter who heavily covered the DGA process did not publish any news articles on the DGA the week of the release.

This case study is only United States based; therefore, it excludes potential perspectives from other countries. Many countries have their own dietary guidance and have their own processes for development. Separately from this work, I recently reviewed more than 10 international versions of dietary guidance. This review indicates that they are relatively similar in nutrition advice but also different in some controversial ways. As an example, some international guidance includes recommendations and/or advice on the issue of sustainability. While there have been public calls for the inclusion of this topic in the U.S. guidance, it has not been included in the DGA to date. It has been deemed out of scope for the work of the DGA by USDA Secretary Vilsack during the 2015 process, and subsequently left out of the questions for the expert committee during the 2020 process. As indicated on the USC Polarization Index, climate change is a very polarizing issue; perhaps if the DGA did cover it, it would be newsworthy enough to potentially be effectively translated to the media.

The latest release, in 2020, also occurred during a volatile time in the American political climate. There was significant controversy around President Trump's use of scientific evidence. The DGA are lawfully jointly released by the Secretary of Agriculture and the Secretary of Health and Human Services, two key members of the President's Cabinet. The DGA, 2020-2025 were released from these Cabinet officials under the Trump Administration. These factors could, for some portion of the population, fuel commentary and criticism around the scientific evidence used throughout the DGA process. It was noted that two headlines even used the phrase "Trump

administration" as a possible hook to promote clicks by politically motivated readers. It is unclear whether the commentary of some of the news articles would have been different if not released under this particular president during this particular time.

A limitation of this type of qualitative work is that the researcher is making the choices and assumptions, carrying forward inherent biases throughout the case work. I attempted to manage these biases with reflexivity. Throughout the process, I attempted to reflect on how I am reading the data and what I am bringing in as my own perspective. Additionally, my committee is strategically made up of experts from each of the fields that are combined in this research, including nutrition science, communication science, and translational science (as outlined in Chapter 2), to help ensure that I was not going outside of the bounds of research or making inappropriate assumptions or connections that did not fit the findings.

Lastly, the data provided an understanding of mechanisms, outcomes, and contexts that are specific to this case, so it is important I do not attempt to generalize its findings. These relationships have not been tested for their causality but rather are offered as hypotheses to guide future inquiry. The outcomes of this research are an interpretation, telling a story of how, in this case, mechanisms had the tendency to work. Since this is translational research, I ultimately need to use these finding to push forward toward action in future research. The knowledge gained from this research is transferrable and can be used, perhaps even corroborated in other, similar cases, and then pushed even further into action in ways that develop and test new models for reducing nutrition confusion. However, this study was not designed to generate generalizable information, nor does it directly translate to all like-cases without additional research.

Lastly, there were some limitations introduced at the onset of this research due to feasibility concerns. One is the inability to triangulate all original researchers, reporters, and

government employees that developed the DGA. Updating the DGA is a rigorous scientific process that includes the development of a scientific report by a committee of 20 recognized experts in the field of nutrition. The report of the scientific committee is then used by the USDA and HHS to advise the development of the DGA, which is written by a writing team of experts in nutrition within the government. This document goes through internal and external peer review, by scientists within the government and outside of the government, including members of the original scientific committee. It is not feasible and therefore beyond the scope of this project to gather information from the multitude of scientific experts that developed this comprehensive peer-reviewed, published document. Similarly, finding ways to triangulate the data for articles written by more than 20 news media authors from across the United States, especially since some articles did not have authors listed, would not have been feasible. To complete the study, I used an external expert interview, anonymized to allow for full honesty. Finally, this case included the use of newspapers as "news media," narrowed for feasibility reasons and based on literature review findings, but it must be acknowledged that many people may be getting information from other news sources (such as television, social media, blogs, etc.) in addition to or instead of print news media. However, the goal of this research is to develop findings that will be narrow in scope and that can be built upon in future research or transferable to applicable contexts.

Translation of Findings

The study findings regarding the translation of nutrition research from the "real-world setting" chosen for this case (UAMS T3) are being used to make recommendations that bridge the gap to improved health nationwide (T4). The goal is not to solve the entire complex problem of how to translate nutrition science, but rather to identify and address one important barrier to effective translation. Specifically, this study identified the *how* and *why* regarding nutrition

translation in the media. I can now attempt to build on this analysis by focusing on specific barriers to be addressed within the larger complex problem. To do that, I provide two recommendations for the government and media and a third recommendation for testing through future research.

Next Steps for Translating These Recommendations to the Government

As a former government employee, I have found that the most effective and transparent way to provide information to the government is through the regulatory process. The DGA process does not follow the formal regulatory, rule-making process, since the DGA are not regulations but instead guidance. However, in the name of increased transparency, the government offers many opportunities for public comment. Once the new docket is opened for the DGA, 2025-2030 process, I plan to submit regulatory comments summarizing my research and recommendations.

Next Steps for Translating These Recommendations to Researchers

The best ways to provide recommendations for future research to researchers on a topic in a specific field (in this case, nutrition) are to publish work in a prominent journal and to present at a major conference attended by colleagues. There are many applicable journals, but the two most well-attended nutrition conferences are the annual meetings for the top two nutrition associations: the Academy of Nutrition and Dietetics and the American Society for Nutrition. Currently, there are no calls for abstracts available for either conference. After graduation, I will assess the agendas for the next major conferences to decide about submitting my abstract to the most appropriate venue. I can also consult with my committee regarding publication. Two journals recommended by committee members thus far include the *Journal of Health Communication* and the *Journal of Nutrition Education and Behavior* (*JNEB*). These journals are

both global in scope. The *Journal of Health Communication* focuses on promoting health literacy for consumers, researchers, and policymakers. Similarly, *JNEB* focuses on advancing nutrition education through research and policymaking. This research could fit well in either publication.

Researcher Reflections

Becoming a translational health scientist has included significant learning and several challenges. I had many different potential dissertation topics. I also had many career changes along the way. Nutrition science is a scientific field with many complex questions that would be impactful to have answered. After landing upon this research gap, I ultimately hope to use the knowledge I have gained to further my career. While working for the government, I was able to gain an inside perspective, which enabled me to make thoughtful recommendations to former colleagues. It also provided me the knowledge of the most effective way to translate my findings and recommendations to the government, which may not be as clear to those without government experience. While I will continue in my current career trajectory but am no longer working within the government, I hope to use my own recommendations in my work with the government, media, and/or interest groups. I would not want any organization I work for to be contributing to nutrition confusion. On the contrary, I hope to be able to bring this knowledge to my future work and find ways to ensure proper translation of nutrition science and nutrition news generally to help dissipate nutrition confusion across the United States.

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Appendix A: Interview Guide

1. Do you remember from reading news about the release of the Dietary Guidelines for Americans, 2020–2025?
2. Why do you think that is the specific thing you remember?
3. Have you read the Dietary Guidelines for Americans, 2020–2025?
4. Do you think the news that you read was aligned with the content of the DGA?
5. Do you think headlines can sometimes be deceiving or leading (either positively or negatively) for the audience?
6. Why would a journalist word something in a way that those with deep knowledge of the situation may find deceiving?
7. I hypothesized that headlines and articles are worded in a certain way or written with a certain tone for clicks/views. Based on your expertise, do you agree?
8. I hypothesized that lay media tends to be more subjective and contextual to get more generalized readership, while placed articles with the intent to educate on a specific commodity tend to be more objective to combat expected conflict of interest. Based on your expertise, do you agree?
9. Are there other hypotheses that may have been missed that you suggest I consider?
10. Anything else to add?

Appendix B: Codebook

Please see the following pages for coding generated by the abstraction of the outcomes (via Reflexive Thematic Analysis and additional explication of the events). This includes summary tables of the media sources (N=20) and the key considerations of the message (per Berlo's SMCR Model of Communication) and lists the characteristics of the analysis (which are detailed in the RQ1 findings).

Content		
Initial extraction based on data item	**iteration 2**	**additional iterations / revisions to codes**
1		
the federal government rejected recommendations by scientific experts on alcohol and added sugar, keeping former recommendations unchanged	the guidelines lack scientific basis	alcohol and added sugar guidelines are wrong
added sugar and alcohol recommendations should be lower	added sugar and alcohol recommendations should be lower	alcohol and added sugar guidelines are wrong
this is the first inclusion of recommendations for babies and toddlers	this is the first inclusion of recommendations for babies and toddlers	actionable recommendations for babies and toddlers are now included
the guidelines have a wide impact	the guidelines have a wide impact	
new evidence is not substantial enough to meet a preponderence of evidence standard required by law	emerging evidence is limited	
food industry groups lobbied intensely	advocates try to influence the process	
scientific committee members believe this is a lost opportunity for a stronger public health message	advocates disagree	
cancer researchers are disappointed because the evidence is overwhelming	advocates disagree	
poor diet is linked to obesity and chronic illness	poor diet is linked to obesity and chronic illness	
the guidelines advise people to follow a healthy dietary pattern and to "make every bite count"	the guidelines are actionable	
2		
these are the first dietary guidelines for infants and toddler	this is the first inclusion of recommendations for babies and toddlers	actionable recommendations for babies and toddlers are now included
the scientists advised stricter limited on added sugar and alcohol.	added sugar and alcohol recommendations should be lower	alcohol and added sugar guidelines are wrong
the guidelines stick with previous advice on alcohol and added sugar	the guidelines stayed the same	
there is more we need to learn (in the scientific literature)	nutrition science is still evolving	
the guidelines are used to set standards for school lunch and other programs	the guidelines have a wide impact	the guidelines have a wide impact, setting nutrition policy in the US
the guidelines say only breast milk until 6 months or iron-fortified infant formula	the guidelines are actionable	actionable recommendations for babies and toddlers are now included
the guidelines say introducing peanut-containing foods the first year reduces risk of allergy to peanuts	the guidelines are actionable	actionable recommendations for babies and toddlers are now included
the guidelines contain more advice than prior guidelines for pregnant and breastfeeding women	the guidelines are actionable	actionable recommendations for pregnancy

these guidelines ignored suggestions by advisors in july, but the evidence isn't clear	evidence is lacking	
the guidelines need to be acceptable to people otherwise they will reject outright	the guidelines are actionable	
more careful scientific research is needed	nutrition science is still evolving	
the guidelines are similar to past advice	guidelines uphold long term advice, nutrition advice is not constantly changing	
the guidelines say make small changes that add up	the guidelines are actionable	
3		
the guidelines are new	the guidelines are new	
the guidelines lay out for the first time what to eat during pregnancy and provide advice for older adults	the guidelines are actionable	actionable recommendations for pregnancy
		actionable recommendations for older adults
the guidelines leave people in the dark about fad diets	the guidelines are not complete / are missing information	
the guidelines have a huge influence on what americans consider healthy and affect companies, labels, and programs	the guidelines have a wide impact	
the guidelines include longstanding (obvious) advice about healthy eating	guidelines uphold long term advice, nutrition advice is not constantly changing	
the guidelines include several changes from past editions	nutrition science is still evolving	
the guidelines don't spell out every food to avoid and embrace, but do recommend actionable advice	the guidelines are actionable	
the guidelines say infantts should be breastfed	the guidelines are actionable	actionable recommendations for babies and toddlers are now included
the guidelines say families should start introducing allergens at 6 months	the guidelines are actionable	actionable recommendations for babies and toddlers are now included
the guidelines recommend children under 2 consume no added sugar	the guidelines are actionable	actionable recommendations for babies and toddlers are now included
the guidelines have a chapter about what adults should eat	the guidelines are actionable	actionable recommendations for adults
the guidelines include a new phrase explicitly saying "drinking less is better for health than drinking more"	the guidelines are actionable	alcohol recommendatinos included

federal officials rejected a more controversioal recommendation from the scientific committee that would have upended 30 years of dietary guidelines	the guidelines stayed the same	government rejects science
the guidelines say mediterranean and vegetarian diets are healthy	the guidelines are actionable	there are specific diets that are healthy
the guidelines don't talk about low carb diets such as atkins or keto	information is missing	
the scientists concluded they didn't have neough research and didn't make specific recommendations	nutrition science is still evolving	
the guidelines don't include inforation about the 3 meals a day apprach to consuming food	information is missing	
4		
trump administration rejected external scientific recommendations	government rejects science	
the guidelines mirror what government has long urged americans to eat	guidelines uphold long term advice, nutrition advice is not constantly changing	
government officials decided not ot adopt stricter alcohol recommendations	the guidelines stayed the same	alcohol and added sugar guidelines are wrong
governement deided to keep obama era advice for added sugars	the guidelines stayed the same	alcohol and added sugar guidelines are wrong
government officials said there wasn't enough evidence for stricter limits on alcohol and sugar	the guidelines stayed the same	alcohol and added sugar guidelines are wrong
there is new advice for infants, toddlers, pregnant and lactating women	the guidelines are actionable	actionable recommendations for babies and toddlers are now included
infants should be exclusively breast fed or have iron fortified formula	the guidelines are actionable	actionable recommendations for babies and toddlers are now included
the governement recommends pregnant and lactating women consumer variety of foods and beverages	the guidelines are actionable	actionable recommendations for babies and toddlers are now included
the guidelines contain a new theme to make every bite count	the guidelines are new	the guidelines contain new information
the health officials recommend small shifts	the guidelines are actionable	
the guidelines have been the subject of political fights and intense lobbying	advocates try to influence the process	
the guidelines govern what is served in major federal nutrition programs and heavily influence nutrition messaging	the guidelines have a wide impact	the guidelines have a wide impact, setting nutrition policy in the US
most people do not follow the government's advice -- linked to diet related disease in americans	the guidelines are not followed	

advocates have criticized the guidelines	advocates disagree	
5		
trump administration rejected a push by the scientists to change recommendations	government rejects science	
citing lack of evidence for a shift	evidence is lacking	
the guidelines issused can impact us programs	the guidelines have a wide impact	
6		
the new guidelines did not make any changes to sugar and alcohol recommended for americans, despite scientists advising otherwise	government rejects science	
new evidence is not substantial enough to support quantitative changes	evidence is lacking	
the recommendations shape the US food industry including school lunches and public health promotions	the guidelines have a wide impact	
7		
make every bite count	the guidelines are actionable	
government released a set of science based guidelines to offer advice on what to eat to promote health and reduce disease	the guidelines are science based	
the guidelines offer advice by life stage and include advice for pregnant and lactating women	the guidelines are actionable	actionable recommendations for pregnancy
some experts are discouraged by what hasn't been amended	the guidelines stayed the same	
	advocates disagree	
recommendations are already low and if they are restricted too far people may give up and stop trying	the guidelines are actionable	the guidelines are actionable but some of the recommednations are too hard
8		
cattle industry objected to the guidelines	advocates disagree	
the guidelines continue to recommend limiting saturated fat and red meat	the guidelines are actionable	fat and meat should be limited
the guidelines aren't controversial among mainstream nutritionists	the guidelines are science based	
advocates criticized saying the new guidelines rely on outdated science	advocates disagree	the guidelines are outdated
emerging evidence shows healthy diets can include red meat and saturated fat	emerging evidence is different than past evidence	new science says meat and fat can be consumed
two of the three examples of healthy foods emphasize plant-based foods	connecting specific recommendations to health (or lack of health)	there are specific diets that are healthy, and those diets include plant based foods

the committee bases recommendations on research and also comments from the public and industry	advocates try to influence the process	
the guidelines recommend a shift from saturated fat to unsaturated fat based on linkage to heart disease	the guidelines are actionable	there are specific diets that are healthy, and those diets should include certain fats and not others
proponents of keto diet have pushed back on the USDA throughout the process	advocates try to influence the process	
9		
used by health care professionals and policy makers	the guidelines are actionable	
provide a foundation for federal nutrition policy	the guidelines have a wide impact	the guidelines have a wide impact, setting nutrition policy in the US
customizing and enjoying nutrient dence fod and bev choices to reflect personal preference cultural traditions and budgetary considerations	the guidelines are actionable	the guidelines are actionable and should be made to work within a person's individual constraints
meeting food group needs with nutrient dense foods and beverages and stay within calorie limits	the guidelines are actionable	there are specific diets that are healthy
the guidance doesn't follow quantitative recommendations in 2 key areas - alcohol and added sugar intake -- addressed by he committee	the guidelines lack scientific basis	alcohol and added sugar guidelines are wrong
suggestions in the science based report can be vetoed when the actual final recommendations take shape and are published	government rejects science	
adults can choose not to drink or drink in moderation by limiting consumption to 2 drinks or less in a day for men and 1 drink or less in a day for women	the guidelines are actionable	the guidelines are actionable and those include not drinking too much alcohol
pregnant women should not drink	the guidelines are actionable	actionable recommendations for pregnancy
no amount of sugar is ok for a baby's development	the guidelines are actionable	actionable recommendations for babies and toddlers are now included (SUGAR)
avoid added sugar in a childs diet	the guidelines are actionable	actionable recommendations for children (SUGAR)
recommended amount of added sugar remained at 10%	the guidelines are actionable	actionable recommendations for adults (SUGAR)
guidelines did add a recommendation for children under 2 to consumer no added sugar whatsoever	the guidelines are actionable	actionable recommendations for babies and toddlers are now included (SUGAR)
the broadest guidelines is to "follow a healthy dietary pattern at every stage of life"	the guidelines are actionable	

first 6 months of life exculsively feed infants human milk	the guidelines are actionable	actionable recommendations for babies and toddlers are now included
the first guideline suggests introducing nutrient dense foods to infants along with "potentially allergenic foods"	the guidelines are actionable	actionable recommendations for babies and toddlers are now included (ALLERGENS)
recommendations align well with AAP policy	advocates agree	
FARE is thrilled to see the includsion of ... guidance around the early introduction of egg and peanuts for infants and toddlers	advocates agree	
a healthy dietary pattern consists of nutrient-dense forms of foods and beverages across all food groups	the guidelines are actionable	there are specific diets that are healthy
limit foods and beverages higher in added sugars, saturated fat, and sodium and limit alcholic beverages at every life stage	the guidelines are actionable	the guidelines are actionable around what NOT to consume (SUGAR FAT ALCOHOL SODIUM)
a child should consume less than 10% saturated fat	the guidelines are actionable	actionable recommendations for children (FAT)
sodium consumption should be less than 2300 mg per day and even less for kids under 14 yrs	the guidelines are actionable	actionable recommendations for children (SODIUM)
guidelines don't touch the topic of red meat	the guidelines are not complete / are missing information	
the guidelines suggest replacing processed or high fat meats	the guidelines are actionable	the guidelines are actionable around what NOT to consume (SUGAR FAT ALCOHOL SODIUM)
the guidelines feel old fashioned and very similar to 2015	the guidelines stayed the same	
We need to restructure how they're deciside upon and put public health agencies in charge	government rejects science	
10		
advocates celebrate the recommendations	advocates agree	
consume half of your grains from whole grains	the guidelines are actionable	there are specific diets that are healthy, and those diets should include whole grains
11		
Advocates call for guidelines to be redrafted	advocates try to influence the process	
the guidelines are likely to maintain high cancer rates, especially among black americans	the guidelines stayed the same	the guidelines stayed the same and they are wrong
the guidelines maintain a racially tinged promotion of dairy	the guidelines stayed the same	the guidelines stayed the same and they are wrong

the new guidelines continue to recommend 3 servings of dairy per day	the guidelines stayed the same	the guidelines stayed the same and they are wrong
people should view this recommendation with caution	advocates disagree	
physicians committee is calling on the usda to rework the guidelines	advocates disagree	
12		
the guidelines reinforce dairy's role in healthy diet	the guidelines stayed the same	the guidelines stayed the same and they are right (DAIRY)
all 3 healthy dietary patterns	the guidelines are actionable	there are specific diets that are healthy, and those include dairy
following these healthy dieratry patterns is associated with a reduced risk of chronic disease like cvd and t2d	the guidelines are actionable	there are specific diets that are healthy
for the first time recommendations for b-24 month are included	this is the first inclusion of recommendations for babies and toddlers	actionable recommendations for babies and toddlers are now included
pleased to see dairy consumption recommended for its contributions to a healthy dietary patters based on scientific evidence	advocates agree	
consistent eveidence demonstrates that a healthy dietary pattern, which includes low and no fat dairy foods is associated with beneficial outcomes	the guidelines stayed the same	the guidelines stayed the same and they are right
the guidelines are an essential resource for health professionals and policy makers as they design and implement food and nurition programs	the guidelines have a wide impact	the guidelines have a wide impact, setting nutrition policy in the US
13		
the latest dgas have yet again confirmed the importance of eating more vegetable such as potatoes that provide potassium and vitamin c	the guidelines stayed the same	the guidelines stayed the same and they are right (VEG / NUTRIENTS)
focus on increased nutrient dense vegetable consumption	the guidelines are actionable	actionable recommendations include eating vegetables
potatoes support all three healthy eating patterns	potatoes are healthy	there are specific diets that are healthy, and those diets include potatoes
the DGAs cover specific recommendations for individuals under 2 years old supporting potatoes as a healthy first food for babies and toddlers	this is the first inclusion of recommendations for babies and toddlers	actionable recommendations for babies and toddlers are now included (potatoes as a first food)
many americans are moving to plant based diets and obtaining enough high quality protein is important; potatoes contain 3 grams of complete protein	potatoes are healthy and contribute protein	there are specific diets that are healthy, and those diets include plant based foods

research suggests that potatoes are an affordable nutrient dense vegetable that provides more nutrients per penny than most other vegetables	potatoes are healthy	the guidelines are actionable and should be made to work within a person's individual constraints
potatoes are a nutritious, affordable option that can be enjoyed a variety of ways	potatoes are healthy	the guidelines are actionable and should be made to work within a person's individual constraints
14		
the release of the first of their kind nutrition guidelines for young children as well as pregnant women	this is the first inclusion of recommendations for babies and toddlers, and pregnant women	actionable recommendations for babies and toddlers, and pregnancy are now included
allows parents to be informed on how to make every bite count	the guidelines are actionable	actionable recommendations for babies and toddlers are now included
thrilled to see this science based approach to baby's nutrition take a more prominent place within the DGA	advocates agree	actionable recommendations for babies and toddlers are now included
make every bite count	the guidelines are actionable	
15		
for the first time recommendations forinfants and toddlers	this is the first inclusion of recommendations for babies and toddlers	actionable recommendations for babies and toddlers are now included
document will now serve as the basis of school lunch programs, nutirtion education efforts, national health objectives, and even disease prevention iniatitives for the next 5 years until an updated version is releaed	the guidelines have a wide impact	the guidelines have a wide impact, setting nutrition policy in the US
government say the new guidelines bring americans a major step forward; nutritionists and other health experts aren't convinced that's the case	advocates disagree	
science based advice on what to eat and drink	the guidelines are science based	
for the most part the new guidelines mirror previous versions but two controversial topics stood out (added sugar / alcohol)	the guidelines stayed the same	the guidelines stayed the same, but it was controversial
federal government didn't heed the expert recommendations	government rejects science	
the governement didn’t take this advice and kept the same limitations from previous guidelines	government rejects science	
the government did accept scientific advice that said children younger than 2 should avoid foods and drinks with added sugar altogether	government accepted some science	

she was disappointed in that the dga didn't adoipt the sugar recommendation	advocates disagree	
it is a lost opportunity for a stronger public health message	advocates disagree	
generally the guidelines say to limit food and drink higher in added sugar saturated fat and sodium, and to limit alcoholic beverages	the guidelines are actionable	the guidelines are actionable around what NOT to consume (SUGAR FAT ALCOHOL SODIUM)
they also suggested pregnant women eat at least 8-12 oz of a variety of seafood	the guidelines are actionable	actionable recommendations for pregnancy
16		
advising make every bite count, but dismissing experts sepcific recommendations to set new low targets for consumption of sugar and alcoholic beverages	government rejects science	
the dietary guidelines have an impact on americans eating habits, influencing food stamp policies and school lunch menus and indirectly affecting how food manufacturers formulate their products	the guidelines have a wide impact	the guidelines have a wide impact, setting nutrition policy in the US
the latest guidelines do not address the current pandemic or new scientific consencuc about the need to adopt dietary patterns that reduce food insecurity and chronic diseases. Climate change does not figure in the advice, which does not address sustainability or ghg emissions	the guidelines are not complete / are missing information	
a report issuesd by a scientific advisory committee last summer had recommended that the guidelines encourage americans to make drastic cuts in their consumption of sugars added to drinks and foods	government rejects science	
the scientific advisory group also called for limiting daily alcohol consumption to 1 drink a day for both men and women	government rejects science	
new guidelines acknowledge that added sugars are nutritionally empty calories that can add extra pounds and conceede that emergining evidence links to alcohol to certain cancers and some forms of CVD	the guidelines are actionable	the guidelines are actionable around what NOT to consume (SUGAR)

officials at USDA and HHS rejected explicit caps on sugar and alcohol consumption	government rejects science	
the new guidelines concede that scientific research "suggests that even drinking within the limits may increase the overall risk of death"	the guidelines are actionable	the guidelines are actionable around what NOT to consume (alcohol)
but the recommendations from 5 years ago … remain in place	the guidelines stayed the same	
the new guidelines do clarify for the first time that limits apply to those days when alcohol is consumed	the guidelines are actionable	
the guidelines reaffirm two important but overlooked health messages	the guidelines stayed the same	the guidelines stayed the same and they are right
the new guidelines do say for the first time that children under 2 should avoid consuming any added sugars	this is the first inclusion of recommendations for babies and toddlers	actionable recommendations for babies and toddlers are now included (SUGAR)
critics were disappointed that the federal agencies had ignored the recommednations of the scientific advisory committee	advocates disagree	
despite repeated claims that the guidelines are science based, the trump agencies igmored the recommendations of the scientific committee they appointed	government rejects science	
instead they reverted to the recommendation of the previous guidelines	the guidelines stayed the same	the guidelines stayed the same and they are wrong
those were big changes and they got all the attention when the report came out … and they were ignored in the final report	government rejects science	
but they ignored the scientific committee which they appointed	government rejects science	
in other ways the guidelines are consistent with previously issued federal recommendations. Americans are encouraged to eat more healthy foods …	government accepted some science	
the guidelines urge the nation to consume less saturated fat, sodium, alcohol and to limit calorie intake	the guidelines are actionable	the guidelines are actionable around what NOT to consume (SUGAR FAT ALCOHOL SODIUM)
for the first time the guidelines take a full life span approach trying to sketch out broad advice for pregnant and breastfeeding adults for children under 2	this is the first inclusion of recommendations for babies and toddlers	actionable recommendations for babies and toddlers and pregnancy are now included

17		
one of the best foods for baby's healthy brain development is already in most refridgerators: eggs	eggs are healthy	actionable recommendations for babies and toddlers are now included (eggs)
dga include recommendations for b-24m old	this is the first inclusion of recommendations for babies and toddlers	actionable recommendations for babies and toddlers are now included
specifcally recommend eggs as an important first food for infants and toddlers and for pregnant women	the guidelines are actionable	actionable recommendations for babies and toddlers are now included (eggs)
eggs provide several key nutrients important for babies during the time in which heir brains are most rapidly developing	the guidelines are actionable	actionable recommendations for babies and toddlers are now included (eggs)
eggs qualify for all 3 healthy eating patterns recommedned in the new guidelines	the guidelines are actionable	there are specific diets that are healthy, and those diets include eggs
the guidelines also affirm that eggs, as a nutrient dense food, can contribute to the health and wellbeing of Americans of all ages in several ways	the guidelines are actionable	there are specific diets that are healthy, and those diets include eggs
18		
the trump administration rejected a scientific advisory groups advise that people further reduce their added sugar and alcohol intake as part of the 2020 update to the dietary guidelines for americans	government rejects science	
while limiting intake of sugars is strongly encouraged throughout the dga the science reviewed by the committee did not provide a preponderence of evidence to support a quantitative change to the specific levels as the committee recommended	the guidelines are science based	
there probably isn't enough evidence at this time to change the guidelines for added sugars	the guidelines are science based	the guidelines stayed the same and they are right (SUGAR)
that the dga states we need to meet nutrient needs first and then we can add some sugars	the guidelines are science based	actionable recommendations for adults (SUGAR)
the new guidelines place a large emphasis on a diet filled with nutrient dense foods giving examples of how added sugars and fats increae the calorie counts of otherwise healthy foods	the guidelines are actionable	the guidelines are actionable around what NOT to consume (SUGAR FAT)

a healthy dietary pattern doesn't have much room for extra added sugars saturated fat or sodium or for alcoholic beverages	the guidelines are actionable	the guidelines are actionable around what NOT to consume (SUGAR FAT ALCOHOL SODIUM)
the group is disappointed that usda and hhs did not accept all of the committees science based recommendations	advocates disagree	
19		
this year's dga was published with a pretty significant footnote	the guidelines are not complete / are missing information	
those reductions were not included in the final guidelines	the guidelines are not complete / are missing information	
recommendations for added sugar and alcohol consumption remained unchanged in the 2020 report	the guidelines stayed the same	the guidelines stayed the same and they are wrong
there was not a preponderance of evidence to substantiate changes	the guidelines stayed the same	the guidelines stayed the same and they are wrong
the report says it is important to limit added sugars and alcohol and the departments response urges more research on how added sugars and alcoholic beverages impact health	nutrition science is still evolving	nutrition science is still evolving (sugar and alcohol)
however there has been quite a lot of recent research on the health dangers of added sugars	nutrition science is still evolving	nutrition science is still evolving (sugar)
sugar has also been a major player in local policy	sugar is being reduced by other governments	
FDA explains that added sugars are included on nutrition facts labels because they have a lot of calories but do not meet many nutritive needs	sugar is being reduced by other governments	
several studies have also found alcohol to be detrmental to health in ways that go beyond the dangers of imparment from drinking too much	nutrition science is still evolving	nutrition science is still evolving (alcohol)
people in the medical and scientific community have already been pushing back against the guidelines, criticizing the government for ignoring some of the science-based evidence in the recommendations	advocates disagree	
according to the 2020 report if the average diet in the us were scored between 1 to 100, ... it would get a score of 59	the guidelines are not followed	
it also indicates many people don't know much about the guidelines	the guidelines are unknown	
20		

includes an instructive catch phrase to "make every bite count"	the guidelines are actionable	
new framework largely resemles the previous doctrine	the guidelines stayed the same	
also stops short of including a key committee recommendation to reduce intake of added sugars	the guidelines are not complete / are missing information	
if there is one thing we know from the new dietary guidelines, it is that good food leads to good health	the guidelines are actionable	there are specific diets that are healthy
there wasn't enough science to back up such reductions	the guidelines are science based	
largely consistent with previous editions and rightfully so	the guidelines stayed the same	
the guidelines include three key revisions: new language on the health risks on diet related chronic disease such as CVD t2d and obesity, expanded look at dietary patterns, more info on nutrient needs throughout an individual's life span	the guidelines are new	there are specific diets that are healthy and the guidelines are actionable across all life stages
the guidelines also include broad recommendations intended to suit "personal preferences, cultural traditions, and budgetary considerations."	the guidelines are actionable	the guidelines are actionable and should be made to work within a person's individual constraints
the guidelines recommend higher intake of nutrient dense foods and beverages and a focus on staying within calorie limits to achieve healthy dietary patterns at various stages of life	the guidelines are actionable	there are specific diets that are healthy and the guidelines are actionable across all life stages
the guidelines also recommend a lesser intake of added sugars saturated fats sodium and alcoholic beverages	the guidelines are actionable	the guidelines are actionable around what NOT to consume (SUGAR FAT ALCOHOL SODIUM)

Elements	Treatment	Structure
1		
• article includes quotes from USDA, advocate groups, and DGAC members • no charts, graphs • additional articles suggested	• article based on exclusive interview with department • right-leaning publication • published in the health&wellness section of news • holds negative tone "rejects recommendation" "science advised lower" and connected this tone to health risks • NOT edu	• headline = NEW GUIDELINES REJECT RECOMMENDATION (alcohol and sugar)/ science advised lower • focuses on controversy, • no actionable advice for readers • no debate • negative to gov • goal to report news of release
2		
• includes quotes from DGAC member • this article provides quotes from the guidelines • includes government quotes	• multiple topics within article • both sides presented (via expert quotes), presented by topic area • this article provides very actionable info to readers • article tone is neutral, presenting facts • AP news is center (not right or left leaning) • not politically focused • educational	• headline about candy and cake, doesn't match article substance • preseted via key topics from guidelines (infants, toddlers, moms, alcohol and men, what's on your plate) • multiple subjeadings • reporting news and educating
3		
• text is quoted, not people	• article includes details on why changes may have been made / history of the evolution of the DGAs (farm bill, obama, guidance on alcohol, etc) • include multiple topics • provides summarized actionable advice for categories • not political • educating, proivdes facts, history, controvery without taking a side	• headline is neutral: what's changed and what hasn't • multiple subjeadings by topic (5 things that changed) • repoting and educating, proivdes facts, history, controvery without taking a side

4		
• includes direct quotes from government officials	• poltico is a well known political new source • includes more specific "trump administration" theme • covers multiple topics • explicitly covers political context • contains some of the actionable advice (minor) • tone moves from negative toward neutral, focuses on controversy first • NOT edu -- reporting news & political hook	• headline points to controversy, even though article covers more topics • subheadings • specific political context • multiple topics
5		
• includes direct quotes from government officials • includes direct quotes from advocates	• positive toward government decision • focus is sugars only • presents as a 2 sided debate • NOT edu	• headline focuses on AFFIRMS guidelines • debate is presented as 3 sides, one side followed by the other, but headline indicates which side was correct (government) • 1 topic only
6		
• includes government quote • reports on other reporting (ie. "WSJ reports") • quotes CDC •quotes WSJ	• in a very political news source, focuses on government • negative tone, connecting unchanged recommendations directly with health issues • further connects health issues with COVID19 • very short article -- only sugar and alcohol • NOT edu	• headline - negative - government rejects sugar and alcohol recommendations, will remain unaltered • 1 topic only
7		
• Outside expert opinion included (NBC contributor), no quotes from those involved in process or "advocates" • video link	• very short / high-level, minimal detail included • no political content • neutral tone • NOT edu	• non-controversial headline relating to the reader "what does it mean for you?" • emphasize "make every bite count" • multiple topics • subheadings

8		
• includes direct quotes from advocates	• meat only; low carb • displays the debate between meat eating diets and health recommendations around higher fat • heavily displays advocate perspective • debate is shown from side of science vs advocate; not as focused on the actual content of the DGA • edu	• controversial headline about meat industry • headline says US promotes plant based protein • 1 topic with subjeadings • low carb missing -- advocate group news
9		
• many quotes from advocates/experts/dga text • website text	• factual article, includes many direct quotes • Very long article • Article slants to the left re commentary between the facts • educational	• headline = new us dietary guidelines include recs for babies and toddlers for first time • non-controversial but article includes much more • many topics w/subheadings
10		
• includes DGA text • most of article is advocate quotes	• no political context • article placed by advocates • AP is neutral / center, this article positive about grains • Educational	• headline = DGA maintains recommendations for grains; consistent with article • placed by grains • 1 topic
11		
• includes links to other sources throughout • includes quotes from unidentified experts and outside research	• article placed by advocates • focused on social context and political climate outside of the guidelines to make a case for redrafting the guidelines • provides additional historical context regarding issue • AP is neutral / center, this article very negative • NOT edu	• headline - negative and controversial, attention grabbing • 1 topics (race/dairy)
12		
• includes DGA text • includes advocate quotes	• no political context • article placed by advocates • AP is neutral / center -- very positive article though • paid content placed by dairy • Educational	• headline - positive - reaffirming health • placed by dairy -- 1 topic
13		
• no quotes, some indirect text	• no political context • article placed by advocates (potatoes) • educational	• headline very positive (to potatoes specifically and vegetables broadly) • 1 topic, no subheadings

14		
• includes expert quotes • includes dga text	• no political context • article placed by advocates (gerber / infant formula) • EDU • positive / placed	• headline = gerber APPLAUDS • 1 topic • no subjeadings
15		
• includes expert quotes • includes dga text	• negative commentary • educational • includes advice + commentary	• headline - negative and controversial, attention grabbing • "experts disappointed over new guidelines" • multiple topics • no sub headings
16		
• quotes from advocates • discussion of pandemic, climate change, etc (not included)	• multiple notes of politics • NYT traditionally leans left • article quotes advocates that disagree with the guidelines and noone from "the other side" • the article is very negative in tone to the gov • not educational	• headline - negative and controversial, attention grabbing • "guidelines sidestep scientific advice" • muti topic/ no sub head
17		
• includes expert quotes • includes dga text • link to video	• no political context • article placed by advocates (egg) • positive • educational	• headline very positive (to eggs) • placed • positive, 1 topic only eggs
18		
• USDA spokesperson quoted • advocates & nutrition experts quoted • direct dga text	• NOT educational	• headline - negative and controversial, attention grabbing • "guidelines ignore recommendations" • 1 topic (sug/alc. Controversy)
19		
• text and experts quoted	• educational (not DGA, historical context, other laws, FDA, etc)	• headline is neutral to negative: what hasn't changed • 1 topic (sugar)
20		
• many quotes from advocates (industry associtations and public health) and government • direct text included	• poltical context not obvious • agripulse tend to lean more right • educational • neutral balanced (even with negative headline)	• headline negative - specific to "rejecting" alcohol and added sugar cuts • multiple topics