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A Mixed-Method Examination of Primary Care Physician Message Strategies to Correct Patient-Held Health Misinformation: An Application of Goals-Plans-Action Theory

Tayah Renea Wozniak
Chapman University, tawozniak@chapman.edu

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Tayah Renea Wozniak

Chapman University

Orange, CA

School of Communication

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Committee in charge:

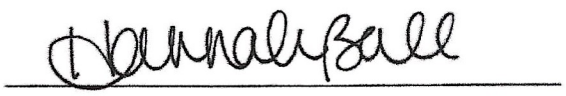
Hannah Ball, Ph.D., Chair

Jennifer Bevan, Ph.D., Co-Chair

Keith Weber, Ed.D.

Dara Sorkin, Ph.D.

The dissertation of Tayah Renea Wozniak is approved.



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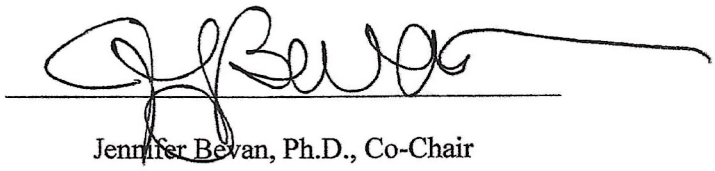

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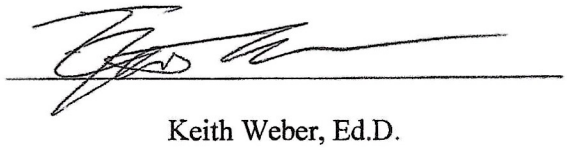

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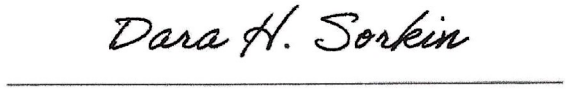

Dara Sorkin, Ph.D.

April 2022

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DEDICATION

I would like to dedicate this dissertation to my husband, Jordan Wozniak. You have physically, mentally, and emotionally supported me throughout my journey to earn a Ph.D. You unconditionally love me as Christ loved the church (Ephesians 5:22-23, ESV). You often sacrificed your wants, desires, and needs to provide for me. Thank you for your constant encouragement and positivity. When I needed to cry, you would hold me, reassure me, and then proceed to make me laugh. You make life more fun, and I am grateful for that. Your selfless desire to serve me and take care of me has sustained me through this stressful and rigorous process. Although you still cannot understand why anyone would want to go to school for this long, you were unrelenting in allowing me to pursue my dreams. My life is better because I am married to you. Here's to the next adventure and chapter of our beautiful life together. I love you!

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"Count it all joy, my brothers, when you meet trials of various kinds, for you know that the testing of your faith produces steadfastness. And let steadfastness have its full effect, that you may be perfect and complete, lacking in nothing" (James 1:2-4, ESV). Completing this Ph.D. program has brought various trials; however, I know the spiritual, personal, and professional growth I have achieved through this process has been worth the challenges I faced. Successful completion of this Ph.D. program would not have been possible without my advisor, Dr. Hannah Ball, and family mentoring, encouraging, and supporting me all along the way.

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To my brothers, Austin and Jamison—I am thankful I was sandwiched between the two of you growing up. Austin, I respect and admire your confidence. I am probably the only younger sibling that was okay with high school teachers calling me Austin's little sister because I knew that meant I was associated with someone who was considered to be determined, hard-working, and successful. Additionally, thank you for our conversations about your correction of parent and patient-held health misinformation, as these provided the foundation for my dissertation idea. Jamison, I respect and admire your perseverance. After being diagnosed with Crohn's disease, you continued to finish your bachelor's degree majoring in Biology with a 4.0 GPA and have excelled in your first two years of Medical School. I am envious of your constant pursuit of excellence despite the enormous challenges you face daily and your display of admirable character through it all. I cannot imagine life without the two of you as my brothers; I love you both!

To my grandpa—I wish you could have been here on earth to see me finish my Ph.D. I miss you so much already, but I know you are happy and pain-free, worshiping our Savior. I miss having someone this side of Heaven that was fiercely in my corner, ready to go to battle for me if I ever needed it. I could truly do no wrong in your eyes, and you always told me I could rule the world. You were always so proud of me, but you never knew how proud I was to have you as my grandpa. What I would give to have one more track meet hearing you cheer me on, or one more theology conversation, or just one more hug and kiss. You meant the world to me. Thank you for building a strong foundation for our family. I cannot wait to join you in Heaven someday to sing Amazing Grace at Jesus' feet. I love you forever, grandpa.

Finally, to my advisor, Dr. Hannah Ball—I tell everyone that I won the lottery with you as my mentor and now friend. You are arguably the most dedicated, committed, and intelligent

person I have ever encountered, and no one works harder than you. Your professionality and consistency are something to be admired. I sought to find a Ph.D. advisor that would ensure I do not leave this program without substantial growth, and you have pushed me to be better from start to finish. You did not shy away from tough conversations, and you taught me to pursue each endeavor with excellence. Thank you for your attention to detail and uncompromising comments/edits to ensure all my work was quality. I appreciate that you have always looked out for my best interests, from research pursuits to applying for jobs. Your desire for me to succeed and confidence in my success has fueled me throughout this process. I look forward to working with you as a colleague and continuing our friendship.

To God be all the glory, “as every good gift and every perfect gift is from above” (James 1:17, ESV).

ABSTRACT

A Mixed-Method Examination of Primary Care Physician Message Strategies to Correct Patient-Held Health Misinformation: An Application of Goals-Plans-Action Theory

by Tayah Renea Wozniak

Given the prevalence of health misinformation (i.e., inaccurate health messaging that lacks scientific evidence), there is a need for successful communication strategies to combat this detrimental health issue (Krishna & Thompson, 2021). Guided by goals-plans-action theory (Dillard, 1990), which explains the communicative process of creating and implementing influence messages, the purpose of this dissertation was to: (a) uncover primary care physician goals, plans, and action when correcting patient-held health misinformation and (b) experimentally test corrective influence messages for their effectiveness from the patient's perspective. Two studies addressed these two purposes. In Study One, results of surveys of primary care physicians ($N = 105$) discovered significant, positive relationships between their primary goal (i.e., correction of health misinformation) and the secondary goals of identity and conversation management. Additionally, Study One results revealed five types of primary care physician strategic message plans during these conversations (i.e., vocalics, clarity, body positioning, listening behavior, relationship-building tone), and five themes for communicative action strategies that primary care physicians use when correcting patient-held health misinformation (i.e., scientific evidence-based explication, recommendations for evaluating health-related information and sources, emotional and/or relationship-building appeal, simple correction, disregard/judgment). Scenario-based corrective influence messaging was created based on communicative action themes from Study One (i.e., scientific evidence, evaluation recommendation, emotional appeal), checked for validity, and pilot tested. In Study Two, U.S.

adults ages 18 years and older (N = 371) were asked to imagine they have found information online saying vaccines contain toxic ingredients and decide to bring this information up to their primary care physician, were randomly assigned to read a scenario from one of these three corrective influence messaging themes, and then reported their perceptions of the primary care physician. Results revealed no significant differences between scientific evidence and emotional appeal messages on key patient outcomes including perceived source credibility, patient satisfaction, intent to communicate with and share online health information to a primary care physician. Results of the two studies provide evidence for the applicability of goals-plans-action theory to the context of health misinformation and corrective influence messages, and yield recommendations for primary care physicians to implement when correcting health misinformation.

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CHAPTER I

A Communication Approach to Health Misinformation

From 1920s cigarette ads claiming "more doctors smoke camels than any other cigarette" (Elliott, 2008) to social media posts stating the COVID-19 vaccine causes infertility (Centers for Disease Control (CDC), 2021; Kelen & Maragakis, 2021), health misinformation has been and continues to be a pervasive health communication issue. Health misinformation is generally defined as inaccurate and misleading health messaging that lacks scientific evidence (Chou et al., 2018; Krishna & Thompson, 2021; Rodgers & Massac, 2020). Contradictory findings and evolving scientific evidence present challenges to health communication. However, health misinformation is distinct as it concentrates on the transmission and belief in false information when there is scientific consensus (Chou et al., 2020). Additionally, health misinformation is separate from disinformation, as misinformation is not intentionally created to deceive (Sell, 2021). Although health misinformation is not a new phenomenon, recent surges in the spread of health misinformation across new media channels (e.g., social media, Bode & Vraga, 2018; Internet, Swire-Thompson & Lazer, 2020) on a variety of health topics (e.g., vaccines, Burki, 2019; tobacco use, Tan & Bigman, 2020; pandemics, Cuan-Baltazar et al., 2020) necessitates increased research attention. Greater awareness of the detrimental effects of the spread of and belief in health misinformation has propagated many researchers to label this public health issue as an information epidemic (Armstrong & Naylor, 2019; Kouzy et al., 2020; Krishna & Thompson, 2021).

Existing research on the health misinformation epidemic is multidisciplinary (e.g., public health, Southwell et al., 2020; health communication, Walter et al., 2020; medical internet research, Cuan-Baltazar et al., 2020; psychology, Scherer et al., 2021). The issue, however, is uniquely communicative as the process involves transmitting a message – albeit incorrect – from

sender to receiver. For example, one infamous piece of misinformation originating from a 1998 publication claimed that the MMR vaccine may cause autism (Geoghegan et al., 2020). Although this single message has since been retracted, continued vaccine hesitancy and anti-vaccine movements still exist and continue to thrive (Dube et al., 2015; Kennedy, 2020), highlighting how both the sender and receiver have distinctive responsibilities to disseminate accurately and critically evaluate communicated health information, respectively. Yet, health misinformation research often compartmentalizes its focus on issues related to either sender or receiver, neglecting a comprehensive perspective of the communicative process. Given that health communication inquiry in particular aims to identify, investigate, and resolve health care and health promotion challenges (Kreps et al., 1998), it is suitable to study health misinformation through the lens of communication to better understand its effects on health-related attitudes, beliefs, and behaviors from both the sender and receiver perspectives. Health misinformation research from a communication perspective would provide greater cohesiveness, consistency, and strategies to combat this information epidemic.

This investigation will provide an overview of health misinformation research in the context of health communication and recommend a theory-driven, communicative approach for strategically correcting vaccine-specific health misinformation. First, the detrimental effects of health misinformation will be discussed, followed by a review of factors that facilitate the spread of misinformation. Specific attention is paid to the role of health disparities, including medical mistrust and low health literacy, which exacerbate exposure to and belief in health misinformation for some individuals. Next, an overview of existing research and strategies to combat and correct health misinformation will be provided. In particular, an emphasis is placed on the communication process associated with health misinformation and the specific role health

communication experts play in stopping this epidemic. Additionally, the specific role of health care providers in correcting health misinformation within conversations with patients will be discussed. Finally, a theoretical framework, goals-plans-action theory (GPA; Dillard, 1990), will be proposed to understand the process of health care providers in correcting patient-held health misinformation and further test these messaging strategies on patients.

Detrimental Effects of Health Misinformation

The health misinformation epidemic is persistent with the potential for far-reaching harmful effects on the public's health, warranting urgent research attention. A new advisory issued by the U.S. Surgeon General highlights the serious threat health misinformation poses to society's health (The U.S. Surgeon General's Advisory on Building a Healthy Information Environment, 2021). It is therefore essential to recognize how the spread of and belief in health misinformation negatively affects individuals' health and well-being, specifically vulnerable populations. Health care misunderstandings, often communication-related, are frequently associated with health disparities (Thomas et al., 2004), as will be discussed more thoroughly later. Additional research is necessary to understand how health misinformation is associated with detrimental health effects, and moreover exacerbated by health disparities (e.g., low health literacy, Krishna & Thompson, 2021; Scherer et al., 2021).

Decisions made based on health misinformation can be life-threatening. For example, misperceptions exist about vaccines' safety and efficacy (Broniatowski et al., 2018, Cornwall, 2020; Wardle & Singerman, 2021), which affect vaccine uptake (Daley et al., 2007; Rogers et al., 2018). For instance, many vaccine-hesitant parents express concerns about anecdotal evidence coincidentally linking vaccination with adverse injuries (Salmon et al., 2015). Vaccines are well-researched and scientifically supported as effective and safe methods to prevent life-threatening diseases, yet there is variance in acceptance among the general public (Barrows et

al., 2015; Shrivastava et al., 2016). Individuals against vaccines or who are vaccine-hesitant put themselves and others at risk for contracting life-threatening illnesses (Callender, 2016). A decision to delay or refuse childhood vaccination puts not only that child at risk but increases the risk of infecting infants who are too young for vaccination as well as individuals who are incapable of getting vaccinated due to medical reasons (Siddiqui et al., 2013). Vulnerable populations, including children and immunocompromised individuals, are disproportionately affected by these misinformed vaccine decisions.

Another harmful health effect of the belief in misinformation includes the delay of effective medical treatment, facilitated by misunderstandings about effective preventative therapies (Lavorgna & Di Ronco, 2019), treatment of diseases (Gage-Bouchard et al., 2018), and use of alternative medicine (Stoneman et al., 2013). Although postponing treatment or using alternative medicine may not necessarily be life-threatening, significant health concerns still exist. Recently, there has been an increase in misinformation on social media related to natural homeopathic remedies, such as using essential oils to "cure" childhood illnesses (Armstrong & Naylor, 2019). One study found that some parents prefer to use homeopathic remedies, such as essential oils, to eliminate lice on their child's head. However, there is no substantial evidence of the efficacy and safety of this treatment (Owens, 2017). Additionally, only 5 mL of concentrated essential oil, a commonly used natural remedy, can cause severe toxicity in children; subsequently, essential oil exposure poisoning is on the rise (Swannell, 2019). Many adults also forgo medical cancer treatments and solely rely on vitamin or herbal supplements (e.g., Vitamin D, turmeric) or specific diets (e.g., Mediterranean Diet) to fight the disease based on inaccurate health information they have read or heard (Wilner & Holton, 2020).

Research also suggests that belief in health misinformation negatively affects lifestyle choices, including diet and exercise behaviors (Dedrick et al., 2020; Rachul et al., 2020; Snyder et al., 2020). Misinformation in the form of trending dietary messages such as dieting by blood type (Cusack et al., 2013) and celebrity or media-influenced nutritional fads (Lee et al., 2018; Myrick & Erlichman, 2020) lack substantiated scientific support yet continue to gain in popularity. Fad diets are routinely associated with poor health outcomes and ill-placed health behavior change (Khawandanah & Tewfik, 2016). Unrealistic media representation of body image also contributes to misinformation about healthy diet and exercise behaviors (Maine et al., 2015). A healthy lifestyle is essential in preventing chronic health conditions (e.g., heart disease, Yeh, 2019), and, as the recent COVID-19 pandemic highlighted, provides protection against the severity of illnesses and diseases (Tavakol et al., 2021). Therefore, continued misinformed lifestyle choices increase an individual's likelihood of falling acutely or chronically ill.

Furthermore, misinformation circulating during epidemics (e.g., Ebola, Sell et al., 2020) and pandemics (e.g., COVID-19, Cuan-Baltazar et al., 2020) – which necessitate immediate lifestyle changes and adherence to recommended health behaviors to reduce risks of adverse health effects – heightens health communication challenges. The outbreak of a novel disease is fraught with uncertainty and a lack of scientific data, increasing opportunities for the spread of misinformation (Nsoesie & Oladeji, 2020; Vraga & Jacobsen, 2020). Moreover, pandemics and epidemics are commonly chosen for researching health misinformation due to information spreading rapidly during these crises (Nsoesie & Oladeji, 2020). Many message sources (e.g., media outlets, political figures, and public health professionals) and various communication channels (e.g., news channels, social media, and the Internet) are employed to disseminate information quickly to a diverse audience, increasing the probability of inconsistencies (Finset et

al., 2020). Inconsistent communication provides an avenue for health misinformation to flourish (Wang et al., 2021). Widely circulating health misinformation intertwined with scientifically-supported data during an emergency health crisis puts an immense burden on public reception and evaluation of all information, demanding high levels of health literacy to enact appropriate health behaviors.

Sender and Receiver Roles in the Spread of Health Misinformation

The sender, receiver, communication channel, and topic of health misinformation varies greatly, increasing the complexity of this issue. In their review of literature from both *Journal of Health Communication* and *Health Communication*, Krishna and Thompson (2021) grouped commonly distributed health misinformation topics into six general categories: medication adherence, exercise and nutrition, cancer information, epidemics and pandemics (e.g., HIV/Aids, Ebola, H1N1, COVID-19), vaccinations, and tobacco use. Health misinformation about these topics reaches widespread audiences within seconds (Zucker, 2020) via a multitude of communication channels, such as social media platforms (e.g., Twitter, Kouzy et al., 2020; Vraga et al., 2021; Pinterest, Wilner & Holton, 2020), blogs (Seymour et al., 2015), Internet websites (Wang, 2018), and media outlets (e.g., T.V. programs, news networks, talk shows, movies; Brodie et al., 2001; Gollust et al., 2019). Additionally, interpersonal communication is an important tool used by campaigns to raise awareness and promote health behavior change (Hendriks et al., 2014; Hwang, 2010). However, it is plausible that health misinformation also spreads during face-to-face encounters (Melki et al., 2021), yet limited research explores interpersonally shared misinformation.

Although many sources facilitate the spread of health misinformation, it spreads faster and to a wider audience than truth on social media platforms (Vosoughi et al., 2018). This is of

particular concern given that research indicates a growing number of Americans use social media frequently for their news (Shearer & Grieco, 2019) and search online for health-related information (KRC Research, 2018). As such, the bulk of misinformation research has focused on online platforms, including social media and Internet websites that have become incubators for perpetuating the spread of health misinformation (Bode & Vraga, 2015; Chou et al., 2018; Del Vicario et al., 2016; Safieddine et al., 2017; Swire-Thompson & Lazer, 2020; Wang et al., 2019). Researchers question why inaccurate health information spreads so quickly online, and reasons include novelty (Vosoughi et al., 2018), sensationalizing news (Wang et al., 2019), and parallels to the phenomenon of rumor proliferation (Berinsky, 2017). Additionally, it is speculated that health misinformation spreads quickly when the subject matter induces emotive responses (e.g., fear), which is subsequently more difficult to combat with fact alone (Zucker, 2020). Given the complexity of why health misinformation quickly spreads and the ubiquitous nature of health information, we must consider the roles of the sender and receiver in the spread of health misinformation.

The transactional model of communication, which depicts that information is communicated from sender to receiver with simultaneous feedback within a specific context (Barnlund, 1970; McCroskey & Richmond, 1996), supports the importance of considering both the sender and receiver roles in the spread of health misinformation. The sender of health misinformation is often responsible for one or more factors affecting the distribution, including perceived source credibility, message framing and design, and the communication channel chosen to disseminate the information (Barnlund, 1970; Paige et al., 2018). Health misinformation begins with one primary source, but as the inaccurate information spreads, the source is often forgotten, and therefore the ability to decipher credibility is lost. Source

credibility plays a vital role in audience perception of health information quality and accuracy (Avery, 2010; Bates et al., 2006; Eastin, 2001) and may play a role in correcting health misinformation (Sui & Zhang, 2021; Vraga & Bode, 2017). Furthermore, the message's design, particularly its persuasive capacity (Rothman & Salovey, 1997), impacts perceived believability and health behaviors among receivers (Gu & Hong, 2019). Lastly, specific communication channels expedite the speed of health misinformation dissemination, including social media platforms (Vosoughi et al., 2018: Wang et al., 2019) and Internet websites (Swire-Thompson & Lazer, 2020). These channels reach a larger audience exposing more receivers to health misinformation.

The receiver also plays a role in spreading misinformation as they seek out or are exposed to health information. Specific receiver characteristics increase vulnerability to belief in misinformation, such as health literacy (Scherer et al., 2021). Krishna and Thompson (2021) assert that individuals with low health literacy and "situational health misliterates" (p. 326), or those who perceive their literacy as high but continue to believe misinformation about specific health-related topics, accept health misinformation more readily. Although fact-checking by social media platforms has mildly slowed the spread of health misinformation (Walter et al., 2020), little research exists examining the importance of personal fact-checking or critical evaluation of health information. Information silos and differential distribution of information across population subgroups also decrease diversity in thought and increases the possibility of repeated exposure without correction (Chou et al., 2018; Tan & Bigman, 2020). Repeated health misinformation exposure and increased receptivity has also been found amongst individuals with greater health disparities (Tan & Bigman, 2020; Viswanath et al., 2012).

Health Disparities Increasing Susceptibility to Health Misinformation

Regulations placed on the sender as well as strategies to inoculate or change receiver beliefs will be necessary to combat the health communication misinformation epidemic. Along these lines, specific attention must be paid to receivers experiencing health disparities and identifying sender opportunities for improving communication of scientific material to lessen the effects of health misinformation within these vulnerable populations. *Healthy People 2030* defines health disparities as socioeconomic and environmental health differences leading to inherent disadvantages (U.S. Department of Health and Human Services, 2021). Individuals experiencing greater health disparities are not only at risk for repeated exposure to health misinformation (e.g., tobacco industry targeted marketing, Tan & Bigman, 2020), but they also often lack necessary communication skills to critically evaluate health information (e.g., health literacy, Song et al., 2019). Effective health information communication from senders such as health professionals is also dependent on overcoming cultural communication barriers that impact the quality of care (Li et al., 2017), medical misunderstandings (Mauro & Profita, 2017; Taylor et al., 2013), and health disparities (Thomas et al., 2004). Additionally, disparities exist within misinformation corrective messaging, such that existing strategies fail to proportionately reach individuals of low socioeconomic status and limited education (Tan & Bigman, 2020), which is particularly problematic given that low socioeconomic status correlates with greater acceptance of health misinformation (Pan et al., 2021).

Health communication is an effective tool in tackling the socioeconomic and environmental health differences contributing to these health disparities in the various contexts in which health misinformation thrives, including mass media and new media technology (Freimuth & Quinn, 2004). Schiavo (2014) stated the ability of health communication to tell "the story of

health disparities and their root causes and to increase public and community engagement on this issue, as well as to encourage and sustain behavioral and social change among different stakeholders, groups, and populations" (p.71). For example, correcting tobacco-related health misinformation requires an understanding of current users' cultural and environmental underpinnings and their historical relationship with medical professionals and scientific sources (Tan & Bigman, 2020). Correcting health misinformation communicatively is only as effective as its ability to integrate the socio-cultural influences of both the sender and receiver into health messaging (Thomas et al., 2004). Identifying key health disparities related to health misinformation will be imperative in creating impactful solutions to combat this pervasive issue; as such, two health disparities key to health misinformation literature are highlighted: medical mistrust and health literacy.

Medical Mistrust

Health misinformation relies on both the sender to disseminate scientifically supported information and the receiver to accept the message. An important aspect of receiving information is the appraisal of the source's credibility, which heavily relies on the perceived trust and character of the source (Hocevar et al., 2017; Hovland et al., 1953; McCroskey & Young, 1981). General mistrust of scientists and scientific research is associated with increased exposure and belief in health misinformation (Camargo Jr. & Grant, 2015; Chou et al., 2020; Collins, 2009, 2014). The spread of and belief in health misinformation itself motivate mistrust in science (Southwell et al., 2019). Likewise, the U.S. Surgeon General recently stated health misinformation "can cause confusion, sow mistrust, harm people's health, and undermine public health efforts" (The U.S. Surgeon General's Advisory on Building a Healthy Information Environment, 2021, p. 2). Skepticism of the scientific and medical communities leads to

decreased interaction with health professionals and less exposure to accurate health information. Research indicates that increased medical mistrust is linked with poorer health outcomes, including health service underutilization (La Veist et al., 2009), decreased patient satisfaction (Guadagnolo et al., 2009), medical adherence (Dale et al., 2016), and lower quality of life (Ballington et al., 2018). Additionally, Ecker and Antonio (2021) demonstrated that when health misinformation is corrected, retractions are only effective when the source is trusted.

Minority populations disproportionately impacted by health disparities also mistrust medical professionals and organizations to a greater extent (Jaiswal & Halkitis, 2019). Notably, many individuals in minority communities develop mistrust based on life experiences or legitimately sourced information (e.g., perceived discrimination, racism, and knowledge of negative health outcome statistics; Bazargan et al., 2021; Powell et al., 2018; Williams, 2021), and then mistrust is worsened by exposure to health misinformation. Research also suggests that medical mistrust is often rooted in historical context (Freimuth & Quinn, 2004). For example, medical mistrust within Black/African American populations partially stems from historic abuse from the scientific community against this population, including the infamous Tuskegee Syphilis studies (Jaiswal & Halkitis, 2019). Moreover, cultural differences in approaching health and health care create misunderstandings and mistrust (Carlisle & Murray, 2020; Jaiswal, 2019). In addition to historical and cultural mistrust, the COVID-19 pandemic highlighted politically affiliated mistrust of media sources, public health organizations, and officials (Ball & Wozniak, 2021; Brenan, 2020; Funk et al., 2020). Improving patient-provider trust relations within communities riddled with health disparities relies on relationship development and successful community partnerships (Wesson et al., 2019).

Health Literacy

As mentioned previously, medical decisions based on health misinformation are detrimental to an individual's health and well-being, and building better relationships with health care providers and medical organizations will improve health literacy. Health literacy, which is a "multidimensional set of characteristics that allow for the comprehension and use of health information to make healthy decisions" (Aldoory, 2016, p. 1), is related to a wide range of poor health outcomes and has been targeted at length to reduce health disparities (Berkman et al., 2011; Paasche-Orlow & Wolf, 2010). Improving health literacy in vulnerable populations requires concentration on both the frontline health care providers' communication and improving individual skills (Nutbeam & Lloyd, 2021), further emphasizing the need to consider both the sender and receiver when studying health misinformation. Although low health literacy is the speculated driving force in individuals' belief in health misinformation (Krishna & Thompson, 2021; Scherer et al., 2021), further research is necessary to identify specific mechanisms behind this association.

As the landscape of available health information increases with new technology, so does the complexity of obtaining, understanding, and using adequate health information (Abdel-Latif, 2020). New technology, specifically social media, presents unique health misinformation challenges (Chou et al., 2020), and targeted efforts are needed to improve health information education and outreach within vulnerable populations. Minority and vulnerable populations are more likely to experience lower levels of health literacy (Eichler et al., 2009) and, therefore, are more susceptible to believing inaccurate health information. For example, at-risk populations, including Black/African American populations, have been routinely targeted by advertisements from tobacco companies that downplay scientifically-supported harmful effects of smoking

(Harlow et al., 2019; Tan & Bigman, 2020). Additionally, research shows that those with the greatest need for health care are also those who have difficulty comprehending health information and navigating health systems (Parker et al., 2003). Strategies to improve health literacy including education, awareness, and information access may prove beneficial in correcting health misinformation (Trethewey, 2020).

Approaches to Correcting Health Misinformation

More imperative than understanding why and how health misinformation is transmitted is correcting its spread and receivers' belief in it. However, much of the research on this phenomenon merely provides recommended strategies as a future direction without empirically testing whether these strategies can effectively combat the spread of health misinformation (Arora et al., 2020; Chou et al., 2020, Trethewey, 2020; Wang et al., 2019). Challenges are evident in reaching individuals exposed to health misinformation, and the efficacy of current corrective mechanisms are varied (Bode & Vraga, 2015; Chandler et al., 2014; Chou et al., 2018; Vraga & Bode, 2017). Correcting health misinformation is complex, and its continued negative influence exists despite rectifying attempts (Johnson & Seifert, 1994; Lewandowsky et al., 2012; Walter and Tukachinsky, 2019; Zimet et al., 2013). Once misinformation is encoded in an individual's memory, it is almost impossible to undo the exposure damage (Zucker, 2020). For example, a meta-analysis examining the continued influence of misinformation found that corrective messaging does not entirely remove the effect of misinformation (Walter & Tukachinsky, 2019). This phenomenon is further exemplified in Johnson and Seifert's (1994) study, which examined the influence of previously encoded information on future judgments even when newer information is contradictory. Consequently, sustained belief in health misinformation has continued detrimental health effects (Zimet et al., 2013). Zucker (2020)

compared health misinformation to an illness that is "prevalent, incredibly infectious, and highly resistant to currently available treatment" (p. 269).

Tested corrective messaging has primarily been used to combat health misinformation on social media platforms (Bautista et al., 2021; Pennycook et al., 2020; Trethewey, 2020; Walter et al., 2020). For example, Tully et al. (2020) found a general hesitancy and furthermore unwillingness of participants to correct or even reply to misinformation on Twitter. A recent meta-analysis found that social media health misinformation corrections were most efficacious when done by an expert source or when an individual is highly engaged with the health topic (Walter et al., 2020). Expert source correction is exemplified by Vraga and Bode's (2017) findings that corrective messages on Twitter about Zika virus were most effective when delivered by the Centers for Disease Control and Prevention (CDC). Alternatively, another research study found individual users on Facebook were more successful in correcting health misinformation (Bode & Vraga, 2018). Often, it takes multiple corrections from different sources on social media to change beliefs in misinformation (Vraga & Bode, 2017). Unfortunately, research demonstrates that people generally overlook social media misinformation (Tandoc et al., 2020), which decreases the likelihood of correction.

Specific corrective messaging features have also shown preliminary efficacy in combatting misinformation, with successful corrections incorporating the following features: messaging source credibility, coherent messaging, worldview accommodation, and the use of narrative (Armstrong & Naylor, 2019; Guillory & Geraci, 2013; Lewandowsky et al., 2012; Sangalang et al., 2019). For example, when messaging is articulate and consistent with an individual's worldview, the correction has been more successful (Walter & Tukachinsky, 2019). Corrections to inaccurate health information often focus on facts and statistics, but using

narratives or storytelling (Sangalang et al., 2019; Shelby & Ernst, 2013) and humor (Vraga et al., 2021) have been successful in correcting health misinformation. However, contradictory findings also exist; for example, Sullivan (2019) found that credible library institutions were ineffective in correcting misperceptions about the flu vaccine on social media. Research also indicates mixed findings on narrative versus nonnarrative corrections (Huang & Wang, 2020). One suggestion for the mixed efficacy in corrective responses is the difference in tone, such as empathy and affirmation versus apathetic and uncivil discourse (Tully et al., 2020; Oz et al., 2018). However, research offers inconclusive results on which tone is most effective in reducing misperceptions and whether tone influences an individual's willingness to offer a correction (Bode et al., 2020; Tully et al., 2020)

Perhaps the varied effectiveness of corrective messaging to combat health misinformation is because studies on this topic are largely atheoretical. Indeed, Zhao et al. (2021) state, "there is a lack of comprehensive theory-driven framework in the literature that was designed for health misinformation detection" (p. 2). A rare exception is the application of the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986), which has been used to detect misinformation on social media platforms (Janze & Risius, 2017) and online (Zhao et al., 2021), explain the spread of inaccurate information (Horne & Adali, 2017), and understand the persuasive mechanism (Lee et al., 2018). Although this application of ELM provides theoretical backing to understand the pervasiveness of misinformation, theory-driven research on effective strategies to combat the spread of and belief in health misinformation will be of greater importance in mitigating this information epidemic. Future research should focus on applying communication theories for a more systematic exploration of strategies to combat health misinformation from both the sender and receiver perspectives. Outlined below is one theoretical

approach to combat health misinformation by utilizing strategic communication between health providers and their patients. Specifically, this research utilizes goals-plans-action theory to examine health care provider motivations for correcting health misinformation in conversations with patients.

The Role of Health Care Providers in Correcting Health Misinformation

Health misinformation is a growing health issue (Southwell et al., 2020; Swire-Thompson & Lazer, 2020), and combating the spread of health misinformation is distinctively communicative. Therefore, health communication researchers and practitioners need to be actively engaged. From the sender's perspective, there needs to be increased engagement in misinformation-related conversations by leading health care providers, public health professionals, and health organizations (Bautista et al., 2021; Sturgill, 2021; Southwell et al., 2020). Expert communication efforts need to span all channels, including social media platforms, online websites, and interpersonal conversations. Health misinformation literature encourages experts in the field to establish credibility with their audiences and platforms through building trust (Armstrong & Naylor, 2019; Paynter et al., 2019; Shelby & Ernst, 2013). Additionally, relationships between health care providers and public health professionals will be imperative to increase trust and, moreover, the acceptance of their scientifically-supported recommendations. Several studies suggest the role health care providers can play in addressing patient-held misinformation, including establishing trustworthy relationships (Arora et al., 2020), participation in misinformation conversations (Southwell et al., 2020), and a more significant presence online (Bautista et al., 2021; Rubin, 2019).

Interpersonal relationship building is imperative for successful patient-provider interactions, including health care provider correction of patient-held health misinformation.

Specifically, patient-centered care is the advocated approach to patient-provider interactions (Dill & Gumpert, 2012). Patient-centered care is defined as “providing care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions” (Jenerette & Mayer, 2016, p. 135). Relationship building is central to this approach to medical care and is achieved through competent communication. Developing the patient-provider relationship requires a health care provider to offer guidance, emotional support, and patient-specific health information (Street Jr. et al., 2010). Additionally, research suggests the significant role of relationship-building skills in combatting health misinformation (Southwell et al., 2020). Therefore, health care providers have the unique opportunity to use competent communication to provide patient-centered care that allows for relationship development with patients, which is important for conversations about health misinformation.

Furthermore, competent interpersonal communication improves patient-provider relationships, leading to greater patient satisfaction and compliance (Berman & Chutka, 2016). Patient cooperation and compliance are achieved through relationship development, competent communication, and information exchange, decreasing conflicting patient-provider perspectives (Burgoon et al., 1987). Kreps (1988) suggested that health care providers must exemplify communication competence to "effectively utilize interpersonal relations skills to seek and share relevant health information" (p. 351), and increased communication competence leads to successful information exchange and decreased information barriers (Wozniak, 2021; Wright et al., 2010). Southwell et al. (2020) suggested that health care professionals may play a role in addressing patient beliefs in misinformation through improving relationships, increasing listening capacity, and greater participation in these conversations. Heath care providers may be

motivated by patient satisfaction (Burgener, 2020), compliance (Lu & Zhang, 2019), and well-being (Street Jr., 2013). Although research supports the centrality of patient satisfaction and compliance as goals health care providers seek to achieve, with the increase in health misinformation, it is important to better understand health care providers' motivations to engage in patient conversations about health misinformation.

As mentioned previously, very few successful approaches exist in strategically correcting health misinformation and current research lacks theoretical framing (Chandler et al., 2014; Chou et al., 2018; Vraga & Bode, 2017). One potential avenue to consider is that health care providers have the opportunity to communicatively correct health misinformation with their patients (Arora et al., 2020; Southwell et al., 2020). Specifically, physician communication with patients is goal-driven, and often a primary goal of these conversations is to change the patient's stance toward a specific health issue (Bylund et al., 2012; Sanders et al., 2018). During a medical visit, physician communication influences patient health-related attitudes and behavior (Butow & Sharpe, 2013; DiMatteo et al., 2012; Nam et al., 2011). Physicians do so by strategically incorporating persuasive and influential messages into their communication (Nam et al., 2011). For example, a systematic review of diabetes management barriers found effective patient-provider communication included providing a rationale for recommended treatments, and persuasive communication was associated with greater patient involvement and greater adherence to a diabetes management regime (Nam et al., 2011). In particular, primary care physicians are in a unique position as they have greater opportunities to build relationships with their patients and more time for persuasive communication because they provide continued care across a person's lifespan (Dugdale et al., 1999; Platonova et al., 2008). To better understand whether these influence attempts extend to the correction of patient-held misinformation, it is

important to first understand why and how primary care physicians correct patient-held health misinformation. Additionally, it is imperative to test patient perceptions of the message strategies that primary care physicians use when correcting health misinformation. As such, the present study will be guided by goals-plans-action theory (GPA; Dillard, 1990) as this theoretical framework describes the "process behind messages intended to influence others" (Bylund et al., 2012, p. 262), such as messages to combat health misinformation.

Goals-Plans-Action Theoretical Overview

Due to the purposeful and goal-driven nature of patient-provider interpersonal conversations, Bylund et al. (2012) recognized GPA as an applicable theory for health care research as it explains how patients and providers create and communicate messages planned to influence each other. Physician communication is often strategic, persuasive, and influential in attempting to promote effective health care and improve health outcomes (Kreps et al., 1998). For example, GPA helps explain influential and goal-driven health care interactions such as a patient asking to return to normal activities after a surgical procedure or a doctor trying to convince their patient to take a recommended medication. Overall, GPA "describes the cognitive plans and communicative actions that lead to goal attainment" (Coffelt & Hess, 2015, p. 222). Specific to health misinformation, the ultimate goal is to combat the spread of and belief in inaccurate health-related information. Therefore, any communicative behavior correcting health misinformation is purposeful and GPA is a viable theoretical framework to help explain the underlying planning process primary care physicians enact to create corrective influence messages during these difficult conversations with patients.

GPA theory explicates the production sequence of creating and communicating influential and persuasive messaging intended to change or maintain others' attitudes or

behaviors (Dillard, 1990). Communication is central to GPA because goals are achieved through communication (Dillard, 1990). The theory is specific to purposeful communication behaviors (Dillard & Schrader, 1989) and assumes individuals, with some level of awareness, make decisions about the messages they produce (Dillard, 2015). Following Smith-Dupre and Beck (1996), the current study assumes that primary care physicians are aware of the messages they create with the purpose of correcting health misinformation. If the physicians are acting purposefully and are aware of their choices, then it is presumed they are conscious of their communication intentions and can articulate the motivations behind their behaviors (Dillard, 2015). As articulated in the name of the theory, GPA includes three main elements to the process of creating influence messages: goals, plans, and action. The following sections review each step of the theoretical process, followed by a discussion of prior GPA research relevant to the current context.

Goals

GPA proposes that the creation of influence messages begins with goals, or the message source's intended outcome of the communication encounter (Dillard, 1990; Dillard & Schrader, 1989). Dillard (2015) described goals as "future states of affairs that an individual is committed to achieving or maintaining" (pp. 64-65). Goals are essential to the influence message creation process (Dillard et al., 1989) as GPA assumes message construction is goal-driven (LaBelle & Ball, 2019). Goals define and instigate motivation for communication behaviors, and without motivation, there is no need for planning or the rest of the production process. As a result, without the ultimate goal of combatting health misinformation, there is not a need for planning related communication behaviors. In the current study, the primary goal refers to correcting patient-held health misinformation.

Primary Goals

GPA suggests two types of goals, primary and secondary, which have been described as the "push" and "pull" force respectively (Sabee et al., 2012). The primary goal is described as the "push" in the process as it initiates and provides guidance to the interaction. Primary goals stipulate the purpose of the interaction and are more specific and context-driven in nature (Sabee & Wilson, 2005). Ultimately, the primary goal is the reason for starting a conversation in the first place, represented as correcting health misinformation in this study (i.e., give advice). Additionally, the importance of the primary goal is directly related to the amount of effort that is placed on planning communication attempts (Henningsen et al., 2011). Even within similar situations (e.g., conversations about disappointing grades) individuals may have very different primary goals (Sabee & Wilson, 2005). Research delineates seven primary or influence goals including gain assistance (i.e., acquire resources), give advice (i.e., provide instrumental support), share activity (i.e., encourage joint ventures), change orientation (i.e., discuss important societal issues), change relationship (i.e., alter the current status of the relationship), obtain permission (i.e., obtain approval or consent), and enforce rights and obligations (i.e., coerce completion of commitments; Dillard, 2015).

Secondary Goals

If primary goals act as the push, then secondary goals act as the "pull" because they may prohibit an individual from taking a direct path towards goal attainment (Sabee & Wilson, 2005). Secondary goals represent general and reoccurring motivations in a person's life (Dillard et al., 1989) and not all secondary goals are significant to every context (Henningsen et al., 2011). The secondary goal generally shapes and may even limit the interaction (Bylund et al., 2012). For example, Imes et al. (2008) examined which secondary goals constrained or influenced patient

communication planning and behavior in relaying online health information to their physicians. These constraints, or secondary goals, manifest within five identified dimensions: identity (i.e., principles and values), conversation management (i.e., impression management and conversational flow), relational resource (i.e., value placed on relationships), personal resource (i.e., material, physical, and temporal concerns), and affect management (i.e., emotion responses; Dillard, 2015).

Primary and secondary goals either work together or against one another in the process of creating and communicating an influence message (Dillard, 2015). The level of compatibility (i.e., incompatible, irrelevancy of secondary goal to the primary goal, and compatible) of primary and secondary goals will predict expected outcomes of the communication encounter. For example, incompatible secondary goals will constrain communication attempts as evident in Imes et al. (2008) where patients refrained from communicating about online health information with their physicians because they felt their concerns were quickly dismissed. On the other hand, when goals align, an individual is able to work towards accomplishing all goals simultaneously (Dillard, 2015).

GPA research has primarily focused on identifying goals, including gaining a better understanding of context-specific goals associated with communication during difficult situations. For example, LaBelle and Ball (2019) discovered goals college students would use to dissuade a peer from misusing prescription stimulants, including the most common goal of providing information to friends. Within the same target population, Henningsen et al. (2013) examined peer confrontation for academic misconduct and Henningsen et al. (2011) identified student goals for discussing a disappointing grade with a teacher. Coffelt and Hess (2015) and Coffelt (2018) sought to better understand the role of goals and plans in the formation of sexual

scripts within marriage (Coffelt, 2018; Coffelt & Hess, 2015). Lastly, specific to health contexts, goals have been evaluated using GPA within primary care medical interviewing (Babler-Schrader & Schrader, 2011), patient primary goals when discussing health-related Internet research with their providers (Imes et al., 2008; Sabee et al., 2012), overall patient-physician communication goals (Smith-Dupre & Beck, 1996), and disclosure conversations about sensitive genetic information with relatives (Samp et al., 2010). Goals are central to all GPA research endeavors because without goals, there is no inherent need for developing plans. Goals, however, do not directly influence communication behaviors since the relationship between goals and action is mediated by plans.

Plans

During the second step of the GPA process, individuals devise plans to pursue both primary and secondary goals. Plans are "mental representations of messages and message sequences that are intended to enable goal attainment" (Dillard, 2015, p. 65). In GPA, plans are intentional and therefore specifically called "influence" plans existing at two levels: strategic (i.e., what needs accomplished) and tactic (i.e., how it will be accomplished; Dillard, 2015). Strategic plans are more general and tactical plans are more specific. Whether strategic or tactical, plans retrieved from memory are based on previous communication encounters and resulting outcomes (Bylund et al., 2012). Additionally, plans vary in "levels of abstraction, complexity, and completeness" (Bylund et al., 2012, p. 262) and many individuals make multiple plans before they choose the one that will be most successful in accomplishing goals (Dillard, 1990; Dillard, 2004; Wilson & Morgan, 2006). In fact, Dillard et al. (1989) argued "the greater the importance of the influence goal, the greater the desire to behave efficaciously—it is expected that variations in the valence of the influence goal will bring about corresponding

variations in degree of planning" (p. 30). Therefore, the degree of planning by primary care physicians in conversations with their patients about health misinformation is dependent upon their perception of its importance. Lastly, time and effort devoted to the process of planning is related to both the confidence in and commitment to engage in the intended behavior to accomplish desired goals (Henningsen et al., 2011).

Planning also determines whether an individual will engage in an influence attempt. The plans an individual cognitively formulates provide the foundation for whether they will engage in a communicative action (LaBelle & Ball, 2019) and plan preparation may either precede or follow engagement decisions (Dillard, 2004). Consequently, the plans that physicians formulate may determine whether they ultimately correct a patient's health misinformation. A decision to engage in an influence attempt is also dependent on the capability of planning effective messaging to overcome possible objections and prior research suggests that the planning process includes the extent to which individuals acknowledge potential barriers in their influence attempt (Wilson et al., 2015). In addition to planning for potential barriers, an individual's mental guidelines (i.e., plans) determines both verbal and nonverbal communication in an influence attempt (Dillard, 1990). As such, the planning process requires an individual to retrieve mental procedures from memory (Bylund et al., 2012). Therefore, it is important that primary care physicians have and can recall positive and effective past experiences communicating about health misinformation to ensure they will engage in these conversations with patients in the future. Effective planning encourages an individual to engage in communication and provides a foundation for successful action.

Action

As plans are the routes individuals take to accomplish goals, action is the implementation of those plans. Determination of goals leads to the planning process that predicts communication (i.e., action; Henningsen et al., 2013). While goals and plans are cognitive, action represents both verbal and nonverbal communication behaviors enacted to influence someone (Dillard, 1990; LaBelle & Ball, 2019). Although goals and plans have been extensively researched, only a few studies have examined the specific communicative behaviors used to enact these plans (i.e., action). Dillard et al. (1997) aimed to explain the four dimensions of action important to the realization of plans and subsequent goals including explicitness (i.e., transparent intentions), dominance (i.e., source-target power differential), argument (i.e., reasoning and rationale behind the action), and control over outcomes. Research also examines message characteristics (e.g., directness, logic, positivity, and confirmation; Dillard et al., 1989; Henningsen et al., 2011; Wilson et al., 2015) as well as communication tactics (e.g., confrontation and whistle-blowing; Henningsen et al., 2013). Although action dimensions and message characteristics are more generalizable (Dillard et al., 1997), specific messaging tactics are context specific, and correction of health misinformation may elicit unique strategies. In this study, action represents the messaging strategies primary care physicians employ to correct patient-held health misinformation.

GPA in Health Contexts

Although GPA has not previously been applied to the context of combatting health misinformation interpersonally within the patient-provider relationship, the theory has been applied successfully to other health contexts. All available health-related GPA research focuses on challenging situations that require strategic goal-driven communication. For example, Wilson

et al. (2015) used GPA as a theoretical framework examining goals and specific messages intended to persuade military family members to obtain mental health professional help. Additionally, Trost and Yoshimura (2006) and LaBelle and Ball (2019) assessed peer-to-peer influential communication within the context of alcohol resistance and interventions for prescription stimulant misuse respectively. Most relevant to this research is the relationship dynamic of patient-provider found in Sabee et al. (2012), which examined patient primary goals for having a conversation with their physician about information they have found during health-related research online, and Imes et al. (2008), which examined why patients refrain from these conversations. Much like patients, physicians have goals for engaging in conversations with their patients and develop specific plans to accomplish those goals (Bylund et al., 2012). It is important then to uncover specific primary care physician goals, plans, and action when correcting health misinformation.

Study Rationale

As previously discussed, the prevalence and pervasiveness of health misinformation is a detrimental public health issue necessitating immediate action (Swire-Thompson & Lazer, 2020; The U.S. Surgeon General's Advisory on Building a Healthy Information Environment, 2021). Effective strategies to combat this problem are limited and inconclusive (Chan et al., 2017; Lewandowsky et al., 2012). One avenue of correction routinely suggested in research is the utilization of medical professionals (Bautista et al., 2021; Southwell et al., 2020), specifically health care providers through interaction with patients. Correcting health misinformation requires strategic messaging from health care providers to influence their patient's attitudes and behaviors making this communication encounter foundationally a process of goals, plans, and action. Because combatting health misinformation requires purposeful communicative behaviors,

GPA's emphasis on the motivation and creation of influence messaging makes it an appropriate theoretical framework to examine primary care physician goals, plans, and action when correcting patient-held health misinformation.

Research encourages dyadic investigation of the patient-provider communication exchange, because "using the GPA model could influence the education of both patients and providers" (Imes et al., 2008, p. 546). Additionally, Bylund et al. (2012) included GPA as an applicable theoretical framework for health communication research due to its ability to explain the process behind intentional and persuasive communication by health care providers. Additionally, GPA has utility in training physicians communicatively as evidenced by its use in developing the Comskil Model of communication skills training (Brown & Bylund, 2008). By understanding the process of message production to correct health misinformation, including formative goals and plans, researchers and practitioners can improve intervention strategies. Additionally, uncovering communication behaviors that physicians routinely use when correcting health misinformation with their patients will provide opportunity for testing these message strategies on patients for perceived usefulness. As such, this two-part study uses GPA to (a) investigate primary care physicians' goals, plans, and action for conversations in which they combat health misinformation with their patients, and (b) experimentally test the effectiveness of these corrective influence messages from the perspective of patients.

Study One

Important to note is that specific goals, plans, and action can vary across contexts (Coffelt, 2018; Imes et al., 2008; Sabee & Wilson, 2005); however, the context of correcting health misinformation has not yet been explored using GPA. Therefore, it is essential to discover what goals, plans, and action primary care physicians implement during corrective conversations

about misinformation with their patients. Specifically, we are interested in primary care physicians' primary goal of correcting health misinformation. Thus, the following research questions are forwarded:

RQ1: To what extent is the importance of primary care physicians' primary goal (i.e., correcting patient-held health misinformation) related to secondary goals (i.e., identity, conversation management, relational resource, personal resource, and affect management)?

RQ2: What are primary care physicians' strategic message plans when correcting patient-held health misinformation?

RQ3: What communicative action do primary care physicians take when correcting patient-held health misinformation?

Study Two

Whereas Study One investigates primary care physician goals, plans, and action when correcting health misinformation during conversations with patients, Study Two tests the effectiveness of these corrective influence messages from the perspective of patients. Effectiveness measures in the current study were identified based on prior health misinformation literature. Effectiveness will be evaluated by perceived source credibility (i.e., perception of a source's competence, goodwill, and trustworthiness; McCroskey and Teven, 1999), patient satisfaction (i.e., perception of health care quality; Ng & Luk, 2019), intention to engage in future communication with the primary care physician, and intention to share online health information with the primary care physician (Imes et al., 2008; Sabee et al., 2012). When correcting health misinformation, the more credible the source, the greater their ability to reduce misperceptions (Vraga & Bode, 2017). Moreover, source credibility can enhance perceived

information credibility (Sui & Zhang, 2021) and patient adherence to medical recommendations (Ledford et al., 2010). Additionally, patient compliance is directly related to patient satisfaction as a result of provider relationship and communication skills (Baummer-Carr & Nicolau, 2017; Berman & Chutka, 2016; Kreps, 1988). Southwell et al. (2020) also emphasized training health care providers communicatively when addressing health misinformation to ensure future communication from patients, specifically about health-related information that patients have found online and are therefore reluctant to share (Imes et al., 2008; Sabee et al., 2012). Thus, the following research question is forwarded:

RQ4: To what extent do corrective influence message strategies differ in patients' (a) perceived source credibility, (b) satisfaction, (c) intentions to communicate with the primary care physician in the future, and (d) intentions to share online health information with the primary care physician?

Summary

The purpose of this dissertation is to (a) examine primary care physician goals, plans, and action when correcting patient-held health misinformation and (b) experimentally test corrective influence messages for their effectiveness from the patient's perspective. Specifically, the first three research questions (RQ1-RQ3) investigate primary care physician goals, plans, and communicative action when correcting health misinformation during conversations with patients. The remaining research question (RQ4) is designed to explore the extent to which corrective influence message strategies elicit different patient health outcomes (i.e., perceived source credibility, patient satisfaction, intentions to communicate with primary care physicians). In addition to providing theoretical implications that extend existing research on GPA to primary

care physicians within the context of health misinformation, results will yield practical implications for how health care providers can effectively combat patient-held health misinformation.

CHAPTER II

Method

Overview

The four research questions delineated above were addressed in two studies. Study One addressed RQs 1-3 using both qualitative and quantitative methods to ask primary care physicians to identify their goals, plans, and action when correcting health misinformation during conversations with patients. Study One results also informed the creation of corrective influence messages that were experimentally examined in Study Two. Specifically, corrective influence message types were derived from the qualitative themes that emerged from the open-ended responses of primary care physicians' actions during conversations with their patients about health misinformation. Study Two addressed RQ4 by experimentally testing patients' perceptions of the different types of corrective influence messages among the following key patient outcomes: source credibility, patient satisfaction, and future intentions to communicate with and share online health information with their primary care physician.

Study One

Recruitment

To participate in Study One, participants were required to be 18 years of age or older, living in the U.S., and a current primary care physician (i.e., family medicine, internal medicine, pediatrics, obstetrics and gynecology, and/or geriatrics) who interacts with patients on a regular basis. After obtaining approval by the university's Institutional Review Board, participants were recruited using a purposive sample (Tracy, 2019) of primary care physicians via both Cloud Research Prime Panels (n = 100) and snowball sampling through personal and social media networks (n = 5; e.g., LinkedIn, Instagram, Facebook). Upon completion of the survey, Prime

Panel participants received a predetermined compensation in the amount they agreed to with the research platform through which they entered the survey. Participants recruited through social media networks were not compensated. The recruitment script and post used to collect social network participants can be found in Appendix A and B, respectively.

Participants

Participants (N = 105) were current primary care physicians living in the U.S. who were 18 years of age or older (see Table 1 for complete participant demographics). Approximately half of the participants identified as female (50%), and about two-thirds of the sample self-identified as White/Caucasian (67%). Participants represented 29 different states across the U.S, and the top two states represented were New York (12%) and California (8%). Primary care physicians identified as being in the following areas of specialty: family medicine (61%), internal medicine (19%), pediatrics (11%), obstetrics and gynecology (4%), geriatrics (1%), and other/not identified (2%). Most participants worked full-time (90%) and many identified working at either a private practice (44%) or a government hospital (15%). Participants worked on average 11.53 years (SD = 13.27) in their current health care position and reported spending on average 23.10 minutes (SD = 18.70) with each of their patients.

Procedures

After providing informed consent, participants completed a 15-minute online survey hosted on Qualtrics (see Appendix C). Modeled after previous goals-plans-action theory literature (Coffelt, 2018; Henningsen et al., 2013; LaBelle & Ball, 2019), the questionnaire was partially inductive using open-ended questions effective in eliciting emergent information (Canary et al., 1993). This exploratory qualitative approach was appropriate because there are no prior studies examining primary care physicians' correction of patient-held health

Table 1: Study One Participant Demographics ($N = 105$)

Characteristic	*M*	*SD*	Min	Max	*n*	%
Age of participant	41.11	13.12	22	80		
Years spent working in current position	11.53	9.82	1	42		
Minutes spent with patients	23.10	18.70	5	160		
Biological sex						
Female					53	50.4
Male					51	48.6
Not identified					1	0.0
Ethnicity[†]						
Asian/Asian American					17	16.0
Black/African American					11	10.4
Hispanic/Latino					12	11.3
Middle Eastern					0	0.0
Native American or Alaska Native					2	1.9
Pacific Islander					0	0.0
White/Caucasian					71	67.0
Employment status						
Work full-time					95	89.6
Work part-time					9	8.5
Specialty area						
Family Medicine					65	61.3
Internal Medicine					20	18.9
Pediatrics					12	11.3
Obstetrics/Gynecology					4	3.8
Geriatrics					1	0.9
Other/not identified					2	1.9
Employer type						
Government hospital					16	15.1
Non-for-profit hospital					8	7.5
For-profit hospital					17	16.0
Private practice					47	44.3
Non-profit organization					10	9.4
Other/not identified					6	5.7
Political affiliation						
Republican					33	31.1
Democrat					35	33.0
Independent					34	32.1
Other					2	1.9

[†] Participants could select more than one category.

misinformation. When no new information or themes emerged from the open-ended responses, a desired saturation point was reached (N = 105; Glaser & Strauss, 1967; Guest et al., 2006).

Upon entering the Qualtrics survey, participants were provided the definition of health misinformation (i.e., "misleading and false information or facts that lack scientific support and evidence") and then were asked subsequent open- and closed-ended questions. Previous research suggests that conversations about health misinformation are not unusual occurrences between health care providers and their patients, as over half of the health care providers (60%) report having one of these conversations with a patient within the last week (Wozniak, 2021). Additionally, many health care providers (54%) report that these challenging conversations occur frequently or very frequently (Wozniak, 2021). Therefore, in Study One participants were first asked to respond *true* or *false* to the item "I have had a conversation with a patient about health misinformation within the previous 12 months"; if they answered false, they were directed to the end of the survey.

Participants who responded true advanced on in the survey and were next told, "we are interested in a specific time you attempted to correct and/or change the mind of a patient when they shared health misinformation with you." Specifically, participants were asked questions about their most recent and successful conversation about health misinformation with a patient in the previous 12 months. A successful conversation was described as one in which the primary care physician effectively corrected health misinformation and/or changed the mind of their patient in regard to the health misinformation. Primary care physicians reported on a scale from 1 (*strongly disagree*) to 7 (*strongly agree)* the extent to which they were efficacious in correcting their patient's health misinformation (M = 5.77, SD = 1.01, α = .81), and the majority reported changing their patient's mind (75%). Health misinformation topics that physicians discussed

with their patients included vaccines (55%), medication (14%), exercise/nutrition (10%), epidemics/pandemics (8%), tobacco use (3%), cancer (1%), and other (9%). Participants were also asked to describe the patient with whom they had the recent and successful conversation about health misinformation. The patients described were on average 42.5 years old (*SD* = 16.80), approximately half were female (52%), and White/Caucasian (62%). After describing and answering questions about this conversation, participants were asked to respond to open- and closed-ended questions about their goals, plans, and action for this interaction (see Appendix C and Instrumentation below). Finally, participants were asked to provide demographic information.

Instrumentation

Action. To elicit primary care physicians' communicative action during the corrective misinformation interaction with their patient, participants were asked to "Please type out the details of your most recent and successful conversation that you had about health misinformation with a patient in the previous 12 months. How did you correct health misinformation with this patient? Specifically, what did you say during the conversation as best you can recall?" (Coffelt et al., 2018). Following the prompt, participants were provided one large essay-style text box to describe the conversation.

Plans. To ensure inclusion of the health care providers' strategic message plans during the conversation, participants were also prompted to be as specific as possible and write out both the verbal and nonverbal strategies they used to execute correction of health misinformation with their patient (Coffelt et al., 2018). Following the prompt, participants were provided one large essay-style text box to describe the communicative strategies.

Goals. In addition to these open-ended questions about plans and action, participants were asked to rate closed-ended items to assess their primary and secondary goals during this interaction. Primary and secondary goals were assessed using a modified version of Henningsen et al.'s (2011) scale originally adapted from Dillard et al. (1989). Dillard et al. (1989) constructed the scale items to fit any influence attempt context and therefore, wording was modified in this study to fit the context of a conversation about health misinformation between a primary care physician and their patient. Participants responded to all Likert items on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

The primary goal scale comprised four items (e.g., "In this conversation, it was very important to me to correct my patient's health misinformation"; $\alpha = .45$, $M = 5.43$, $SD = 0.88$). Secondary goals comprised the following five dimensions: *identity* (five items; e.g., "In this conversation, I was concerned with not violating my own ethical standards"; $\alpha = .61$, $M = 5.11$, $SD = 1.05$), *conversation management* (five items; e.g., "I wanted to make a good impression in this conversation"; $\alpha = .70$, $M = 5.06$, $SD = 1.04$), *relational resource* (three items; e.g., "I was not willing to risk possible damage to our patient-provider relationship in order to correct them"; $\alpha = .41$, $M = 3.92$, $SD = 1.16$), *personal resource* (three items; e.g., "My patient could have made things very bad for me if I kept on correcting them"; $\alpha = .88$, $M = 2.98$, $SD = 1.61$), and *affect management* (four items; e.g., "In the conversation, I avoided saying things which might have made me apprehensive"; $\alpha = .82$, $M = 3.72$, $SD = 1.44$).

Data Analysis

Quantitative. To address RQ1, the extent to which primary goal importance is related to different secondary goals (i.e., identity, conversation management, relational resource, personal resource, affect management) was examined using a statistical software analysis program (i.e.,

SPSS 24). Relationships between primary and secondary goals were examined using a series of Pearson correlations, followed by post hoc comparisons of the magnitude of statistically significant correlation coefficients using a Fisher *z*-test.

Qualitative. RQ2 and RQ3 were addressed by analyzing the responses to the open-ended questions about strategic message plans and communicative action using the grounded theory approach (Glaser & Strauss, 1967; Strauss & Corbin, 1998) so that themes would emerge not from prior GPA literature, but rather inductively from the data. First, I read all primary care physician responses several times to fully understand the breadth of the data (Strauss & Corbin, 1998). Following guidelines presented in Tracy (2019), after organizing and cleaning, I conducted primary-cycle coding and created two codebooks, one for "plans" and another for "action." During the coding process, I used the constant comparative method (Strauss & Corbin, 1998) to "compare the data applicable to each code, and then modify code definitions to fit new data" (Tracy, 2019, p. 220). After initial coding, I engaged in secondary-cycle coding to begin organizing data based on interpretive categories (Tracy, 2019). During this phase of coding, analytic themes were selected based on frequency, extensiveness, intensity, specificity, internal consistency, and participant perception of importance (Krueger & Casey, 2015).

Investigator triangulation (i.e., utilization of multiple researchers in the coding process) and self-reflexivity (i.e., honest awareness of self-identity and research approach) were used when developing themes to ensure the credibility and sincerity of analysis (Tracy, 2019). Furthermore, the trustworthiness of the research study was enhanced using intercoder reliability to identify discrepancies and differences among researcher coding (Tracy, 2019). Myself and two undergraduate research assistants trained in qualitative coding and unfamiliar with the study goals coded each response and then intercoder reliability was determined. Full participant

responses were used as the unit of analysis in the coding of "action" responses, whereas individual communication behaviors comprised the unit of analysis in the coding of "plans" responses (i.e., participant responses for "plans" were segmented into individual communication behaviors before coding occurred).

After an explanation of the codebooks, each coder individually coded 10% of all responses (Lombard et al., 2002). Intercoder reliability for each codebook (i.e., plans, action) was assessed using percent agreement using Krippendorff's alpha (Lombard et al., 2002; Tracy, 2019). Hayes and Krippendorff (2007) argue Krippendorff's (2004, 2011) alpha is the standard measure of reliability for content analysis as it can be used for any number of observers, different levels of measurement, and sample sizes, and accounts for missing data. According to Krippendorff (2004), although an acceptable reliability value of alpha is greater than or equal to .67, a value equal to or greater than .80 is desirable. Acceptable reliability across the three coders was achieved for both the "plans" ($\alpha = .92$) and "action" ($\alpha = .83$) codebooks. After adequate intercoder reliability was obtained, I coded the remaining responses with the codebooks. The final "plans" and "action" codebooks are available in Appendix D and E, respectively.

Study Two

Recruitment

To participate in Study Two, participants were required to be 18 years of age or older and living in the U.S. After obtaining approval by the university's Institutional Review Board, participants were recruited using a purposive sample (Tracy, 2019) of individuals via both Cloud Research Prime Panels ($n = 162$) and snowball sampling through personal and social media networks ($n = 209$; e.g., LinkedIn, Instagram, Facebook). Upon completion of the survey, Prime Panel participants received a predetermined compensation in the amount they agreed to with the

research platform through which they entered the survey. Participants recruited through social media networks were not compensated. The recruitment script and post used to collect social network participants can be found in Appendix H and I, respectively.

Participants

Participants ($N = 371$) were individuals living in the U.S. who were 18 years of age or older (see Table 2 for complete participant demographics). About two-thirds of the participants identified as female (60%), and most of the sample self-identified as White/Caucasian (78%). Participants varied in age from 18 to 89 years old ($M = 43.43$, $SD = 18.43$). Participants were students (13%) or reported working full-time (43%), part-time (9%), or not currently working or retired (30%). Participants also represented a variety of education and income levels, as well as political affiliation. The majority of participants reported having health insurance (88%) and of those who had health insurance indicated having a PPO (36%), HMO (16%), Medicare (17%), or Medicaid (11%). Nearly half of the participants had been to the doctor's office as a caretaker (47%) and most participants had personally (80%) gone to the doctor in the previous 12 months. Participants reported spending an average of 17.84 minutes ($SD = 16.50$) with their primary care physician during a typical doctor's office visit.

Procedures

After providing informed consent, the recruited participants completed a 15-minute online survey using Qualtrics (see Appendix J). Each participant was randomly assigned to read one of six corrective influence messages addressing health misinformation about vaccine toxicity. Each of the six corrective influence messages represented a total of three communicative action themes that emerged from the qualitative data collected in Study One (see Message Creation below). Participants then answered a host of scales assessing patient outcome

Table 2: Study Two Participant Demographics ($N = 371$)

Characteristic	*M*	*SD*	Min	Max	*n*	%
Age of participant	43.43	18.43	18	89		
Minutes spent with doctor	17.84	16.50	0	150		
Biological sex						
Female					224	60.4
Male					124	33.4
Not identified					23	6.2
Ethnicity[†]						
Asian/Asian American					30	8.1
Black/African American					19	5.1
Hispanic/Latino					30	8.1
Middle Eastern					1	0.3
Native American or Alaska Native					6	1.6
Pacific Islander					3	0.8
White/Caucasian					288	77.6
Other					6	1.6
Employment status						
Work full-time					158	42.6
Work part-time					35	9.4
Student, part-time or full-time					48	12.9
Not currently employed, retired					110	29.6
Highest educational degree earned						
High school/GED					117	31.5
Associates					43	11.6
Bachelors					90	24.3
Masters					59	15.9
Ph.D./Ed.D.					12	3.2
M.D.					4	1.1
Other/did not earn a degree					27	7.3
Household total annual income						
Under $10,000					20	5.4
$10,000 to $19,999					23	6.2
$20,000 to $29,999					27	7.3
$30,000 to $49,999					44	11.9
$50,000 to $74,999					53	14.3
$75,000 to $99,999					40	10.8
$100,000 to $149,999					57	15.4
$150,000 or more					58	15.6
Political affiliation						
Republican					123	30.7
Democrat					114	33.2
Independent					90	24.3

[†] Participants could select more than one category.

variables based on the corrective influence message they received including perceived source credibility, patient satisfaction, future communication with their primary care physician, and sharing online health information with their primary care physician. Additionally, health literacy and primary care physician trust were assessed and used as covariates. Lastly, participants were asked to respond to various demographic questions.

Message Creation

Before final implementation in Study Two, corrective influence messages were created based on Study One results and pilot tested. Study One qualitatively identified communicative action themes that represented primary care physicians' effective correction of health misinformation with their patients. These "action" themes identified in Study One were used to create the corrective influence messages experimentally tested in Study Two. Five total themes emerged from the data, including: (1) scientific evidence-based explication, (2) recommendation for evaluating health-related information and sources, (3) emotional and/or relationship-building appeal, (4) simple correction, and (5) disregard/judgment (see Appendix E). Only the first three themes (i.e., scientific evidence, evaluation recommendation, emotional appeal) were used in creating the messages because research suggests simple corrections are ineffective in combatting health misinformation (Ecker et al., 2019; Roozenbeek & van der Linden, 2022). Additionally, disregard or judgmental corrections may induce reactance (i.e., backfire effects; Brehm, 1966; Brehm & Brehm 1981; Lewandowsky et al., 2012) and therefore as a result of judgmental communication, individuals may counterargue or strengthen initially held beliefs in health misinformation (Dan & Dixon, 2021; Lewandowsky et al., 2012).

To create the corrective influence messages, three communicative action themes (i.e., scientific evidence, evaluation recommendation, emotional appeal) were adapted to a scenario in

which participants were asked to imagine they found information online saying vaccines contain toxic ingredients and that they decide to bring up this information to their primary care physician at their next doctor's office appointment. Vaccines represent a common health misinformation topic found in literature (Krishna & Thompson, 2021; Wozniak, 2021) and were the most reported topic of patient-held misinformation identified by primary care physicians in Study One. After participants read the scenario, they were randomly assigned to read a corrective influence message from their primary care physician that corrected this vaccine-related health misinformation. Three messages for each of the three communicative action themes were created and pilot tested to prevent case-category confound (i.e., when categorical differences are drawn by comparing representatives of the contrasting categories; Jackson, 1992). Thus, a total of nine messages were checked by a board-certified medical doctor and a registered nurse for validity and then pilot tested as detailed below.

Pilot Test

Prior to full implementation, the nine corrective influence messages were pilot tested for realism, believability, and the extent to which participants could imagine themselves in the situation (see LaBelle & Ball [2019] and Wilson et al. [2015] for similar study methodology). Additionally, to ensure messages were representative of their corresponding "action" theme, three manipulation check items were integrated (i.e., scientific evidence: "The message provided scientific evidence to explain why the health information was incorrect"; evaluation recommendation: "The message provided recommendation for finding credible health information and sources"; emotional appeal: "The message provided an emotional and personal response to correct the health misinformation"). Manipulation check items were rated on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

Pilot test participants were undergraduate students enrolled in an Introduction to Research Methods course at a medium Western university ($N = 59$). Each participant was asked to read three of nine potential messages, one randomly assigned from each thematic category, and then rate their perceptions of each message (see Pilot Test Instrumentation below). Each corrective influence message was randomly assigned to a total of 18 to 23 participants.

Pilot Test Instrumentation

Perceived realism of message. Perceived realism regarding the corrective influence messages was assessed using three 7-point Semantic Differential items averaged together to create a composite measure of message realism. The participants were asked, "To what degree was the message you just read": (a) believable (1 = *not very believable,* 7 = *very believable*); (b) realistic (1 = *not realistic*, 7 = very *realistic*); and (c) easy to imagine yourself hearing this message from a health care provider (1 = *not very easy*, 7 = *very easy*; LaBelle & Ball, 2019; Wilson et al., 2015). The perceived realism measure produced a Cronbach's alpha reliability coefficient of .85 ($M = 5.08$, $SD = 1.39$).

Perceived believability of information. The degree to which participants believe the health information in the message they have read from the health care provider was assessed using five 7-point Semantic Differential items (i.e., agree/disagree, false/true, incorrect/correct, right/wrong, yes/no) from McCroskey and Richmond's (1996) generalized belief measure. The items were averaged to create a composite measure of general belief in the message. The perceived believability measure produced a Cronbach's alpha reliability coefficient of .96 ($M = 4.97$, $SD = 1.54$).

Imagine having a similar conversation. To assess whether individuals could imagine themselves in the situation, participants were asked to rate whether they have had a similar

conversation with a primary care doctor on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). This single item was adapted from previous GPA studies (LaBelle & Ball, 2019; Wilson et al., 2015) and descriptive statistics were assessed ($M = 3.40$, $SD = 1.75$).

Pilot Test Results

Means, standard deviations, and corresponding *p*-values for all the pilot test variables are located in Tables 3 and 4. The main purpose of the pilot test was to select two corrective influence messages from each theme that were similar in perceived believability, realism, the extent to which participants could imagine themselves in the situation, and the theme's corresponding manipulation check item. First, *t*-tests were conducted between each of the three corrective influence messages within each theme to compare levels of realism, believability, and imagining themselves in the situation. Results of independent samples *t*-tests indicated statistically significant differences between scientific evidence messages one and three for believability ($p = .03$) and emotional appeal messages two and three for realism ($p = .02$) and believability ($p = .04$). In other words, scientific evidence messages one and three were not similar for believability, and emotional appeal messages two and three were not similar in both realism and believability. Therefore, due to the significant differences identified for scientific evidence message three and emotional appeal message three, these messages were considered for elimination.

Next, similarities were found for all three pilot test variables (i.e., believability, realism, and imagine) between scientific evidence messages one and two, evaluation recommendation messages one, two, and three, and emotional appeal messages one and two. To identify similarities between scientific evidence messages, results of independent samples *t*-tests indicated statistically nonsignificant differences between scientific evidence message one and

Table 3. Pilot Test for Realism, Believability, and Imagining: Independent Samples *t*-tests and Corresponding *p*-values.

	N	*M*	*SD*	1	2	3
Scientific Evidence						
1. Realism: Message 1	19	5.70	0.97	-		
2. Realism: Message 2	19	5.68	0.87	.95	-	
3. Realism: Message 3	21	5.14	1.20	.12	.11	-
1. Believability: Message 1	19	5.63	1.18	-		
2. Believability: Message 2	19	5.08	1.29	.18	-	
3. Believability: Message 3	21	4.63	1.53	.03	.32	-
1. Imagine: Message 1	19	3.11	1.66	-		
2. Imagine: Message 2	19	3.95	2.01	.17	-	
3. Imagine: Message 3	21	3.14	1.28	.94	.32	-
Evaluation Recommendation						
1. Realism: Message 1	19	5.54	1.32	-		
2. Realism: Message 2	19	4.60	1.64	.06	-	
3. Realism: Message 3	21	5.03	1.46	.25	.38	-
1. Believability: Message 1	19	5.31	1.54	-		
2. Believability: Message 2	19	4.51	2.09	.19	-	
3. Believability: Message 3	21	5.35	1.48	.92	.07	-
1. Imagine: Message 1	19	3.53	1.61	-		
2. Imagine: Message 2	19	2.79	1.96	.21	-	
3. Imagine: Message 3	21	3.71	1.65	.72	.11	-
Emotional Appeal						
1. Realism: Message 1	18	4.87	1.48	-		
2. Realism: Message 2	18	5.20	1.22	.47	-	
3. Realism: Message 3	23	4.14	1.53	.13	.02	-
1. Believability: Message 1	18	4.97	1.36	-		
2. Believability: Message 2	18	5.17	1.49	.68	-	
3. Believability: Message 3	23	4.22	1.43	.10	.04	-
1. Imagine: Message 1	18	3.06	1.86	-		
2. Imagine: Message 2	18	3.67	1.82	.33	-	
3. Imagine: Message 3	23	3.57	1.85	.39	.86	-

Table 4. Pilot Test for Manipulation Check Items: Independent-Samples t-Tests and Corresponding *p* Values.

	N	*M*	*SD*	1	2	3	4	5	6	7	8	9
Scientific Manipulation Check: Participants who read...												
1. Scientific Evidence Msg. 1	19	5.58	1.02									
2. Scientific Evidence Msg. 2	19	4.79	1.48									
3. Scientific Evidence Msg. 3	21	4.71	1.35									
4. Recommendation Msg. 1	19	4.37	1.61	0.005	0.406	0.464						
5. Recommendation Msg. 2	19	3.00	1.41	<.001	<.001	<.001						
6. Recommendation Msg. 3	21	4.38	1.99	0.021	0.469	0.529						
7. Emotional Appeal Msg. 1	18	3.06	1.47	<.001	0.001	<.001						
8. Emotional Appeal Msg. 2	18	3.28	1.81	<.001	0.008	0.007						
9. Emotional Appeal Msg. 3	23	3.30	1.58	<.001	0.003	0.003						
Recommendation Manipulation Check: Participants who read...												
1. Scientific Evidence Msg. 1	19	4.21	1.48				0.042	0.931	0.625			
2. Scientific Evidence Msg. 2	19	3.53	1.68				0.003	0.248	0.102			
3. Scientific Evidence Msg. 3	21	4.00	1.30				0.011	0.648	0.348			
4. Recommendation Msg. 1	19	5.37	1.89									
5. Recommendation Msg. 2	19	4.26	2.16									
6. Recommendation Msg. 3	21	4.48	1.89									
7. Emotional Appeal Msg. 1	18	3.06	1.63				<.001	0.062	0.017			
8. Emotional Appeal Msg. 2	18	2.78	1.63				<.001	0.024	0.005			
9. Emotional Appeal Msg. 3	23	3.04	1.49				<.001	0.045	0.008			
Emotional Appeal Manipulation Check: Participants who read...												
1. Scientific Evidence Msg. 1	19	3.89	1.41							<.001	<.001	0.005
2. Scientific Evidence Msg. 2	18	3.84	1.61							<.001	<.001	0.005
3. Scientific Evidence Msg. 3	21	3.57	1.75							<.001	<.001	0.001
4. Recommendation Msg. 1	19	3.95	1.39							<.001	<.001	0.006
5. Recommendation Msg. 2	19	3.37	1.77							<.001	<.001	<.001
6. Recommendation Msg. 3	21	3.57	1.69							<.001	<.001	0.001
7. Emotional Appeal Msg. 1	18	5.83	1.76									
8. Emotional Appeal Msg. 2	18	6.06	1.43									
9. Emotional Appeal Msg. 3	23	5.43	1.83									

two for realism (p = .95), believability (p = .18), and imagine (p = .17), scientific evidence message two and three for realism (p = .11), believability (p = .32), and imagine (p = .32), and scientific evidence message one and three for realism (p = .12) and imagine (p = .94). To identify similarities between evaluation recommendation messages, results of independent samples *t*-tests also indicated statistically nonsignificant differences between evaluation recommendation message one and two for realism (p = .06), believability (p = .19), and imagine (p = .21), evaluation recommendation message two and three for realism (p = .38), believability (p = .07), and imagine (p = .11), and evaluation recommendation message one and three for realism (p =

.25), believability (p = .92), and imagine (p = .72). Lastly, to identify similarities between emotional appeal messages results of independent samples *t*-tests also indicated statistically nonsignificant differences between emotional appeal message one and two for realism (p = .47), believability (p = .68), and imagine (p = .33), emotional appeal message two and three for imagine (p = .86), and emotional appeal message one and three for realism (p = .13), believability (p = .10), and imagine (p = .39). As the purpose of the pilot test was to find similar messages to implement in Study Two, the results from comparing believability, realism, and imagine indicated that the most similarity occurred between scientific evidence messages one and two; evaluation recommendation messages one, two, and three; and emotional appeal messages one and two.

Furthermore, *t*-tests were conducted between each corrective influence messages across themes for each manipulation check item (i.e., scientific evidence, evaluation recommendation, emotional appeal) to ensure the messages were representative of their own "action" theme. First, each of the three scientific evidence messages were compared to the other messages (i.e., three evaluation recommendation and three emotional appeal messages) for the first manipulation check item (i.e., scientific evidence). Results of independent samples *t*-tests indicated that scientific evidence messages two and three were not significantly different than evaluation recommendation messages one (p = .41, p = .46) and three (p = .47, p = .53) on the scientific evidence manipulation check item. Next, each of the three evaluation recommendation messages were compared to the other messages (i.e., three scientific evidence and three emotional appeal messages) for the second manipulation check item (i.e., evaluation recommendation). Results indicate evaluation recommendation message two was not significantly different than scientific evidence messages one (p = .93), two (p = .25), and three (p = .65) and emotional appeal

message one (p = .06) on the evaluation recommendation manipulation check item. Additionally, evaluation recommendation message three was also not significantly different than scientific evidence messages one (p = .63), two (p = .10), and three (p = .35) on the evaluation recommendation manipulation check item. Lastly, each of the three emotional appeal messages were compared to the other messages (i.e., three scientific evidence and three evaluation recommendation messages) for the third manipulation check item (i.e., emotional appeal). All three emotional appeal messages were significantly different than all scientific evidence and evaluation recommendation messages on the emotional appeal manipulation check item.

In summary, the pilot test was conducted to select two corrective influence messages from each theme that were similar in perceived believability, realism, the extent to which participants could imagine themselves in the situation, and the theme's corresponding manipulation check item. A series of *t*-tests were conducted between each of the three messages within a specific "action" theme (i.e., scientific evidence, evaluation recommendation, emotional appeal) to ensure the messages within each theme were similar for believability, realism, and the extent to which participants could imagine themselves in the situation. Additionally, a series of *t*-tests were conducted between each corrective influence messages across themes for each manipulation check item (i.e., scientific evidence, evaluation recommendation, emotional appeal) to ensure the messages were representative of their own "action" theme. Collectively, these results informed the selection of two corrective influence messages from each "action" theme to be included in the final Study Two survey: scientific evidence messages one and two; evaluation recommendation messages one and three; and emotional appeal messages one and two.

Study Two Instrumentation

Source credibility. Perceived source credibility of the health care providers was assessed using McCroskey and Teven's (1999) source credibility measurement examining goodwill (six items), trustworthiness (six items), and competence (six items). These items were rated on a 7-point Semantic Differential scale for participant perceptions of the message's source (e.g., goodwill: cares about me/doesn't care about me; trustworthiness: honest/dishonest; competence: intelligent/unintelligent). The source credibility measures produced the following Cronbach's alpha reliability coefficients: *goodwill*, $\alpha = .89$ ($M = 5.04$, $SD = 1.35$); *trustworthiness*, $\alpha = .93$ ($M = 5.34$, $SD = 1.35$); *competence*, $\alpha = .91$ ($M = 5.40$, $SD = 1.31$).

Satisfaction. Patient satisfaction with the health care provider after reading the corrective influence message was assessed using a patient satisfaction measure from Richmond et al. (1998). The Perceived Quality of Medical Care (PQMC) scale was used to assess general satisfaction of the medical care the patient received after reading the corrective influence message. The PQMC included six 7-point Semantic Differential items (i.e., high quality/low quality, personable/impersonal, uncaring/caring, concerned/unconcerned, beneficial/not beneficial, unsatisfactory/satisfactory) with higher scores indicating higher satisfaction ($\alpha = .94$, $M = 4.92$, $SD = 1.51$).

Intentions for future communication. Intentions for future communication with the health care provider were assessed using a behavioral intention scale used in Henningsen et al. (2011) adapted to the current context. Participants rated three items on a Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Items included "In the future, I intend to discuss health information about vaccines with this health care provider," "In the future, I will try to discuss health information about vaccines with this health care provider," and "In the future, I plan to

discuss health information about vaccines with this health care provider" (α = .96, *M* = 4.56, *SD* = 1.75).

Intentions to share online health information. Four items were created based off findings from Imes et al. (2008), which uncovered reasons why patients refrain from communicating about online health information with their health care provider. Each Likert item was rated by participants on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Example items include "I wouldn't share information I have found online about vaccines with this health care provider because I don't want to sound paranoid or a hypochondriac" and "I wouldn't share information I have found online about vaccines with this health care provider because I am embarrassed for searching health information on the Internet or social media" (α = .81, *M* = 4.53, *SD* = 1.44).

Health literacy. Self-perceived health literacy was assessed using 10 items from Chung and Nahm's (2015) Health Literacy Screening Tool by Self-Perception. Items were rated on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*) with example items including "I am capable of finding the health information that I need" and "I am capable of describing my health problems to medical staff members such as physicians." A higher score indicates greater self-perception of health literacy (α = .93, *M* = 5.59, *SD* = 0.97).

Trust. General trust in a participant's regular health care provider was assessed using a three-item Likert scale adapted from the Larzelere and Huston's (1980) dyadic trust scale (e.g., "I feel that I can trust my regular health provider completely" and "I feel that my regular health provider can be counted on to help me"). Items were rated on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). This general trust measure produced a Cronbach's alpha reliability coefficient of .73 (*M* = 5.32, *SD* = 1.28).

Data Analysis

Prior to the main analysis, preliminary independent samples *t*-tests were conducted between each pair of messages representing the three "action" themes for each manipulation check item to ensure messages could be collapsed into their overarching theme. For example, evaluation recommendation messages one two were compared on its corresponding manipulation check item (i.e., "The message provided recommendation for finding credible health information and sources"). Notably, there was a significant difference on the evaluation recommendation manipulation check item between these two evaluation recommendation messages ($p = .02$). Because the manipulation check was not successful for these messages, the evaluation recommendation theme was excluded from subsequent analyses.

To determine if the four remaining individual influence messages (i.e., two scientific evidence, two emotional appeal) could be combined into two total message conditions, two analyses of variance (ANOVA) were conducted, each with experimental condition as the fixed factor and the two manipulation check items (i.e., 1 = "The message provided scientific evidence to explain why the health information was incorrect", 2 = "The message provided an emotional and personal response to correct the health misinformation") as the dependent variables. Results showed significant main effects were present for the scientific evidence manipulation check item, $F(3, 247) = 4.57$, $p = .004$, $\eta^2 = .01$, and for the emotional appeal manipulation check item, $F(3, 246) = 19.13$, $p < .001$, $\eta^2 = .03$.

Post hoc analysis utilizing the Tukey HSD technique for the scientific evidence manipulation check item revealed that the two scientific evidence influence messages did not significantly differ from one another ($p = .89$). There was however a significant difference between the second scientific evidence message and the second emotional appeal message ($p =$

.006). In addition, Tukey HSD post hoc analysis for the emotional appeal manipulation check item revealed that the scientific evidence messages were significantly different than both of the emotional appeal messages (scientific evidence message 1/emotional appeal message 1: $p < .001$; scientific evidence message 1/emotional appeal message 2: $p < .001$; scientific evidence message 2/emotional appeal message 1: $p < .001$; scientific evidence message 2/emotional appeal message 2: $p = .002$). Additionally, the two emotional appeal influence messages did not significantly differ from one another ($p = .999$). As such, the message conditions were collapsed within each theme, for a total of two message types to be used in the final analysis (i.e., scientific evidence and emotional appeal). Means, standard deviations, and ANOVA results are located in Table 5.

Table 5. Study Two Pre-analyses: Means, Standard Deviations, and One-Way Analyses of Variance (ANOVAs)

	Scientific Message 1		Scientific Message 2		Emotional Message 1		Emotional Message 2		ANOVA	
Manipulation Check Item	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F* (3, 247)	*p*
1. Scientific Evidence	4.20	1.77	4.44	1.63	3.68	1.81	3.37	1.82	4.570	0.004
2. Emotional Appeal	3.18	1.74	3.95	1.83	5.08	1.51	5.03	1.43	19.125	< .001

Lastly, RQ4 was evaluated using a multivariate analysis of covariance (MANCOVA), with corrective influence message type (i.e., scientific evidence, emotional appeal) serving as the independent variable and source credibility, patient satisfaction, intentions for future communication, and intentions to share online health information serving as the dependent variables. Health literacy and trust were used as covariates.

Summary

Outlined above are the procedures for participant recruitment, data collection, instrumentation, and data analyses for both Study One and Study Two. In summary, Study One recruited primary care physicians to answer both open- and closed-ended questions regarding their goals, plans, and action when correcting patient-held health misinformation. Primary care physician answers to closed-ended questions regarding primary and secondary goals were

evaluated statistically using a Pearson correlation analysis, followed by post hoc Fisher *z*-tests of statistically significant results (RQ1). Primary care physician answers to open-ended questions regarding their plans and action when correcting health misinformation were evaluated qualitatively using a grounded theory approach (RQ2 and RQ3). Study Two recruited patients (i.e., anyone 18 years of age or older and living in the U.S.) to answer survey questions related to their perceptions of a randomly assigned corrective influence message correcting vaccine health misinformation based on three "action" themes from Study One. Differences among corrective influence messages in terms of key patient outcomes (i.e., perceived source credibility, patient satisfaction, intentions to communicate with their primary care physician, intentions to share online health information with their primary care physician) while controlling for health literacy and physician trust were assessed using a multivariate analysis of covariance (RQ4).

CHAPTER III

Results

Research Question One

RQ1 addressed the extent to which the importance of primary care physicians' primary goal of correcting patient-held health misinformation was related to secondary goals (i.e., identity, conversation management, relational resource, personal resource, and affect management). Pearson correlations between primary care physicians' primary goal and these secondary goals are included in Table 6. Results of Pearson correlations revealed significant, positive relationships between the primary goal and the secondary goals of (a) identity ($r = .31$, $p = .001$) and (b) conversation management ($r = .29$, $p = .003$). In other words, primary care physicians placing greater importance on the primary goal of correcting patient-held health misinformation tended to also report stronger secondary goals of identity and conversation management. No other significant correlations were found between the primary goal and remaining secondary goals (i.e., relational resource, personal resource, and affect management).

Table 6. Study One Zero-Order Correlation Matrix

	1	2	3	4	5	6
1. Primary Goal	-					
2. 2nd Goal: Identity	.31**	-				
3. 2nd Goal: Conversation Mgmt.	.29**	.49†	-			
4. 2nd Goal: Relational Resource	-.03	.10	.13	-		
5. 2nd Goal: Personal Resource	-.06	.17	.33†	-.13	-	
6. 2nd Goal: Affect Mgmt.	-.04	.19	.45†	-.10	.61†	-

Note. * $p < .05$, ** $p < .01$, † $p < .001$. Two-tailed.

To further investigate the complex interrelations between these goals, a Fisher *z*-test was conducted to compare magnitudes of statistically significant correlation coefficients between the primary goal and secondary goals of identity and conversation management. Examination of the

two-tailed Fisher *z*-values revealed no significant difference in the magnitude between correlation coefficients (*z*-value = 0.16, $p = .87$). In other words, the correlation between the primary goal and secondary goal of identity was not significantly stronger than that between the primary goal and secondary goal of conversation management.

Research Question Two

RQ2 addressed primary care physicians' strategic message plans when correcting patient-held health misinformation. Specifically, participants were asked what verbal and nonverbal communication strategies they used to correct health misinformation when describing their most recent and successful conversation in the previous 12 months with a patient. Salient verbal and nonverbal communication strategies that emerged from the data are delineated below.

Vocalics or Paralanguage

First, primary care physicians reported using various vocalics including *pitch*, *rate/pace*, *volume*, *vocal variety*, and *rhythm* ($n = 51$). Different vocalics or paralanguage were used by participants to improve patient understanding and retention as well as highlight something important. For example, one participant stated "I spoke slow and loud so they could properly hear and understand me. Additionally, another participant spoke slowly "to emphasize something that [they felt was] important." Many other participants tried to mimic everyday conversations to ensure comfortability. For instance, one participant shared they "tried to keep speech volume and tenor normal [to imitate a regular] conversation."

Clarity

Participant strategic message plans also attempted to simplify and competently communicate medical information to facilitate patient understanding ($n = 35$). Primary care physicians reported techniques such as *summarizing information*, *avoiding unnecessary jargon*,

using *visual aids*, *articulating clearly*, and displaying *professionalism*. For example, many primary care physicians expressed the importance of "[speaking] clearly and without medical jargon" as well as the need to "summarize the recommendation and correct information" Clarity was also achieved when physicians used visual aids (e.g., research studies, websites with scientific information, pamphlets, product material, and hand-drawn pictures) to enhance their explanations. Lastly, one aspect of professionalism is the ability to communicate information competently. Likewise, one of the most important aspects of a primary care physicians' profession is to clearly communicate medical information to their patients. Consequently, several participants reported they maintained professionalism with their patients during their conversations about health misinformation, speaking clearly and competently.

Body Positioning

Next, primary care physicians used strategic message plans that modeled attentiveness and relaxation through the use of specific body language (n = 31). Participants reported adjusting their body to *face the patient*, *sitting down* with their patient, providing *physical touch*, and maintaining a *relaxed body posture.* Many primary care physicians noted they were seated with their patient including one who indicated they "were sitting across a desk from each other at the same level" and another "purposely sat down at [their] desk so that [the patient] could feel comfortable and not overwhelmed." Lastly, some participants tried to maintain a relaxed posture to "create a very relaxed and low-key mood [...] to better connect with [patients, so] they are more receptive to what [the physician has to say]." Responses revealed primary care physicians used their body positioning to make patients comfortable and receptive during these conversations.

Listening Behavior

Primary care physicians also reported exhibiting listening engagement through both nonverbal and verbal communication strategies (n = 65). To show they were listening to their patients, physicians maintained *eye contact*, *nodded*, *limited distractions and interruptions*, provided *affirmations to patient responses*, and *asked questions*. Additionally, participants showed they were engaged with their patients by making themselves *available* to talk, ensured they *understood* the patient's concerns, and remained *nonjudgmental* during the conversation about health misinformation. Many primary care physicians reported using eye contact with patients, with one physician emphasizing this nonverbal communication strategy by stating they "used a lot of eye contact." Participants also mentioned how important it was to limit distractions and interruptions; for example, one physician reported they "focused on listening to concerns and not interrupting [making] sure to sit and focus and keep eye contact throughout the discussion." Often, participants noted they would affirm and listen to patient concerns first before speaking. Lastly, one particular individual noted the use of "motivational interview techniques that returned questions to the patient for engagement." Primary care physician responses revealed an overall willingness to listen and engage in conversation with their patients.

Relationship-Building Tone

Finally, primary care physicians reported strategic message plans that communicate attitude or emotion and seek to build mutual trust and respect with their patients (n = 67). Communication from these physicians exhibited attitudes and emotions such as *positivity*, *confidence*, *firmness*, *calmness*, *empathy*, *friendliness*, *honesty*, and *assurance*. Additionally, participants attempted to keep the conversations *casual* and *familial* in nature to build trust. In one instance, a physician noted using a "bright and positive tone (avoiding sounding harsh,

scolding, or condescending)." Additionally, another individual reported using a "gentle, inviting, but firm tone to make the discussion an inviting conversation and affirmed [their patient's] concerns." To show friendliness nonverbally, another primary care physician "spoke in a very calm and sympathetic manner and smiled after to show encouragement." Many participants also indicated they spoke in a calming tone to reassure the patient and acknowledge their concerns. It was evident in the responses that many of the primary care physicians were trying to build trust with their patients with both verbal empathy and sympathy.

Research Question Three

RQ3 addressed the communicative action of primary care physicians when correcting patient-held health misinformation. Specifically, participants were asked what they said during a successful conversation in which they attempted to correct health misinformation with a patient. Salient themes that emerged from the responses are delineated below.

Scientific Evidence-Based Explication

One prominent theme throughout the responses from primary care physicians was the use of scientific evidence-based explications to correct health misinformation with patients (n = 37). This strategy involved communicating *risk/benefits*, *facts/science/research*, as well as *resources* such as credible public health websites (e.g., CDC website) to explain why the health misinformation was incorrect to change the mind of patients. One specific physician described in their conversation with a patient about misinformation that they not only explained the scientific research on the topic, but also shared important resources as reflected in the following quote: "[The patient] felt the COVID vaccine caused COVID. I explained the pharmacology of the vaccine in an effort to show otherwise. [I] also showed the FDA decision memorandum where the data from the initial trial was available." Another primary care physician took the time to

address health misinformation by presenting facts and contextual evidence for the safety of the COVID vaccine:

> Well the time I can remember most recently, was about of course the COVID vaccine. They were under the impression that they could become infertile. They thought the vaccine was rushed to market and we didn't understand about mRNA and how it interacts with the body. I explained to her that mRNA has been studied for around 50 years and we are very well understand how it works. And that there has been no proof of the COVID vaccine being unsafe and causing infertility.

In addition, many physicians discussed the risk and benefits related to the health misinformation that their patients shared as this individual stated:

> I spoke with [the patient] about health risks in not getting the vaccine as well as the potential side effects of the vaccine as well as the prevalence of these side effects. I showed him the white papers and research to show the prevalence.

In general, it was evident that many primary care physicians used examples of scientific evidence, facts, or resources to correct health misinformation.

Recommendations for Evaluating Health-Related Information and Sources

A second theme that emerged from descriptions of conversations that primary care physicians had with their patients about health misinformation was recommendations for evaluating health-related information and sources (n = 11). These messages gave patients advice for navigating health information seeking and identifying reputable sources. When using this strategy, physicians typically communicated the importance of *finding valid information*, *checking source credibility and reputation*, *thinking critically*, and/or *asking medical professionals questions* about the information that patients find. Many participants suggested the

importance of finding accurate health information, as reported by one physician who stated, “I will say that they should be very careful about the health information they digest and put to use.” Additionally, participants spoke to their patients about the downside of obtaining health-related information from noncredible sources. For example, a physician reported “I spoke about how media can tell patients supposed helpful tips that eventually lead them to some doctor’s office and how it was vital to avoid such influence.” Similarly, one participant said:

> I have discussed with patients about the lack of quality information online and the intense need for scrutiny, critical thinking, and checking references and sources for medical information obtained from Facebook, in particular. It's terribly misinforming information a lot of the time.

In many instances, participants told their patients to make sure they ask their health care provider about any health information they find online or are unsure about. Many also reported telling their patients to stop looking up information on social media or the Internet and go to their doctor instead.

Emotional and/or Relationship-Building Appeal

Many primary care physicians also corrected health misinformation by utilizing emotional and relationship-building appeals with patients (n = 20). Specifically, some of the methods physicians used included *sharing anecdotes*, *personal experiences*, and *fear appeals*. Additionally, primary care physicians expressed caring for their patients and attempts at building trust and rapport to correct or change the mind of patients. For example, one physician recounted a conversation in which they petitioned emotionally to a patient in the following quote:

> I had this patient who was Jehovah's Witness, but his parents had died, and he had been

> adopted by a Christian family, the boy needed a blood transfusion urgently but did not want to accept it because of his religion, so I told him that there was nothing wrong and that his god would not be mad at him. In fact, he would be very happy because the boy would survive. The boy accepted it and the blood transfusion was performed, that is how I saved a life.

Often, physicians expressed an effort to build a relationship with their patients by caring for their concerns. For instance, as one participant detailed about their attempt to connect with a patient:

> I had a very nice 12-year-old patient that suffers with depression. She was talking to me about all her struggles and how it affects her, overall, my patient and I feel more connected and comfortable. I was able to help and protect her.

Some primary care physicians tapped into their past experiences and provided personal or anecdotal examples to change the mind of patients. For example, one physician addressed their patient's concerns by "using anecdotal information about my personal experience so [their patient] felt safe." Ultimately, these responses invoked patients to consider the physical and emotional detrimental health effects related to belief in health misinformation.

Simple Correction

Some primary care physicians were very straightforward when correcting health misinformation without much detail as to why the information was incorrect and/or inaccurate (*n* = 14). These simple corrections offered little to no explanation or discussion with the patient. For example, one primary care physician noted "[The patient] believed that the COVID vaccine was killing about 100 people per day. I simply told them it was entirely inaccurate and has been given to billions." Likewise, another participant stated "[The patient] thought he could get chlamydia from kissing a girl. I told him he had to have sexual intercourse with someone who had

chlamydia in order to catch it." These messages were often short, to the point, and more like declarative statements than a conversation about the health misinformation.

Disregard/Judgment

Lastly, the disregard/judgment strategy emerged from messages that communicated indifference or disrespect towards patients by being dismissive or thinking negatively about their opinions, thoughts, and beliefs regarding health misinformation (n = 7). Physicians who reported disregard in their messages often came across as arrogant, patronizing, and condescending. One participant stated, "They didn't believe the information about COVID-19 and end[ed] up getting sick," showing disregard for the patient's belief in misinformation and subsequent detrimental acquisition of an illness. Additionally, some physicians noted being frustrated with the misinformation patients were believing, with one participant stating, "This patient was a 47-year-old male complaining of not trusting vaccines for COVID-19. This patient had listened to extreme views and far right news." Some physician messages were condescending, making fun of the information some patients were believing. For example, one physician noted, "I recently had a successful conversation about COVID vaccination and the need for public health in general in a society. It was to a patient who was a real jerk about common sense things like this." Overall, these messages voiced frustration and diminishing patience for patient belief in common topics about health misinformation.

Research Question Four

To assess the extent to which corrective influence message strategies differ in patient perceptions, a multivariate analysis of covariance (MANCOVA) was conducted with message type (i.e., scientific evidence, emotional appeal) serving as the independent variable; source credibility, patient satisfaction, intentions for future communication, and intentions to share

online health information serving as the dependent variables; and health literacy and trust serving as covariates. Results of the MANCOVA indicated no statistically significant difference between the message types on the combined dependent variables when controlling for health literacy and trust [Wilks' $\Lambda = .98$, $F(3, 214) = 0.86$, $p = .53$, $R^2 = .02$]. Means and standard deviations for the dependent variables included in the MANCOVA are included in Table 7. Additionally, correlations among all Study Two variables can be found in Table 8.

Table 7. Study Two MANCOVA Descriptive Statistics

Dependent Variable	Message Type	*M*	*SD*
Source Credibility: Competence	Scientific Evidence	5.31	1.36
	Emotional Appeal	5.25	1.29
Source Credibility: Goodwill	Scientific Evidence	4.98	1.41
	Emotional Appeal	4.93	1.40
Source Credibility: Trustworthiness	Scientific Evidence	5.31	1.41
	Emotional Appeal	5.11	1.41
Patient Satisfaction	Scientific Evidence	4.82	1.55
	Emotional Appeal	4.78	1.42
Intentions for Future Communication	Scientific Evidence	4.47	1.76
	Emotional Appeal	4.40	1.77
Intentions to Share Online Health Information	Scientific Evidence	4.45	1.44
	Emotional Appeal	4.56	1.28

Table 8. Study Two Zero-Order Correlation Matrix for all Variables

	1	2	3	4	5	6	7	8	9
1. Source Credibility: Competence	-								
2. Source Credibility: Goodwill	0.81†	-							
3. Source Credibility: Trustworthiness	0.87†	0.90†	-						
4. Patient Satisfaction	0.73†	0.74†	0.75†	-					
5. Intentions for Future Communication	0.38†	0.41†	0.40†	0.52†	-				
6. Intentions to Share Online Health Information	0.36†	0.44†	0.40†	0.41†	0.23†	-			
7. Health Literacy	0.21†	0.22†	0.26†	0.16**	0.20†	0.04	-		
8. Trust in Primary Care Physician	0.41†	0.47†	0.44†	0.32†	0.21†	0.32†	0.30†	-	
9. Belief in Health Misinformation	-0.38†	-0.38†	-0.40†	-0.36†	-0.20**	-0.27†	-0.12*	-0.25†	-

Note. * $p < .05$, ** $p < .01$, $^{\dagger}p < .001$. Two-tailed.

Summary

This chapter explicates findings from both Study One and Two that were conducted to address the four research questions of this dissertation. Results from Study One analysis of quantitative ratings of conversational goals revealed a significant and positive association between primary care physicians' primary goal of correcting patient-held health misinformation and the secondary goals of identity and conversation management. Additionally, results from Study One analysis of qualitative coding of primary care physicians' responses revealed various strategic message plans and corrective influence actions when correcting health misinformation with their patients. Primary care physicians reported different verbal and nonverbal strategic message plans including vocalics/paralanguage, clarifying techniques, body positioning, listening behavior, and relationship-building tones. Themes of primary care physicians' communicative action when correcting patient-held health misinformation included scientific evidence-based explication, recommendations for evaluating health-related information and sources, emotional and/or relationship-building appeals, simple correction, and disregard/judgement. Three communicative "action" themes (i.e., scientific evidence, evaluation recommendations, and emotional appeal) were used to construct messages that were experimentally tested in Study Two. Results from Study Two exhibited no difference in patient perceived source credibility, satisfaction, intentions to communicate with the primary care physician in the future, and intentions to share online health information with the primary care physician based on type of corrective influence message strategy.

CHAPTER IV

Discussion

This dissertation had two purposes guided by GPA (Dillard, 1990). The first purpose of this dissertation was to examine primary care physician goals, plans, and action when correcting patient-held health misinformation. Secondly, this dissertation sought to experimentally test corrective influence message strategies for their effectiveness from the patient's perspective. Two unique studies were conducted to address these purposes. In Study One, primary care physicians shared types of strategic message plans and communicative action they implemented in a recent, successful conversation with a patient in which they corrected health misinformation. Additionally, the primary goal of correcting health misinformation was correlated with five distinct secondary goals to identify significant associations between physicians' conversational goals. Next, the communicative action themes from Study One informed the creation of corrective influence messages that were experimentally tested in Study Two. In Study Two, individuals were randomly assigned to read one of six corrective influence messages representing three "action" strategies (i.e., scientific evidence, evaluation recommendation, emotional appeal) to test for differences in patient-perceived effectiveness (i.e., perceived source credibility, patient satisfaction, intention to communicate with, and intention to share online health information with the primary care physician). The collective findings of these two studies are explicated below, followed by the theoretical and practical implications of the results, the limitations of the two studies, and recommendations for future research examining primary care physician corrective message strategies of patient-held health misinformation.

Review of Findings

Study One

Relationship between Primary and Secondary Goals. The first research question inquired about the relationship between the importance that primary care physicians place on the primary goal of correcting patient-held health misinformation and their secondary goals for the interaction (i.e., identity, conversation management, relational resource, personal resource, affect management). Significant positive relationships emerged between the primary goal and both the secondary goals of identity (i.e., personal principles and values) and conversation management (i.e., impression management and conversation flow). Significant relationships were not found between the primary goal and secondary goals of relational resource, personal resource, and affect management. Furthermore, results indicated no difference in the strength of correlation coefficients between the primary goal and secondary goals of identity and conversation management.

On the nature of the relationship between primary and secondary interaction goals, GPA research describes primary goals as the "push" (i.e., initiation of the interaction) and secondary goals as the "pull" as they may shape or limit the interaction (Bylund et al., 2012; Sabee et al., 2012). Additionally, primary and secondary goals either work together or against one another, depending on their level of compatibility (Dillard, 2015). Results of Study One revealed that identity and conversation management were compatible with correcting patient-held health misinformation, such that the more important the primary goal of correcting patient-held health misinformation, the more relevant the secondary goals of preserving one's values/standards and maintaining social appropriateness during the conversation. Alternately, the goals of relational resource (i.e., value placed on relationships), personal resource (i.e., material, physical, and

temporal concerns), and affect management (i.e., emotion responses; Dillard, 2015) were found irrelevant in this particular context. These results highlight the motivation of primary care physicians to shape conversations with patients about health misinformation in a way that maintains their principles, values, and impression perception. On the other hand, it shows primary care physicians are less concerned with the personal, relational, and emotional aspects of correcting their patient's health misinformation.

Important to note, previous research suggests that not all secondary goals are significant to every context (Henningsen et al., 2011; Imes et al., 2008). For example, Imes et al. (2008) sought to identify context-specific constraining factors (i.e., secondary goals) influencing a patient's decision to discuss Internet health information with their health providers. The relevant secondary goals (e.g., face-saving concerns, turf issues) were dependent on patient-provider communication, trust, and relationship comfortability (Imes et al., 2008). Likewise, Babler-Schrader and Schrader (2011) found nurse practitioners' conversations with patients pursue instrumental, relational, and self-presentational goals when they conduct medical interviews. A case study of an exemplar conversation between a patient and their physician showed the importance of self-disclosure as a relationship tactic in accomplishing mutual goals (Smith-Dupre & Beck, 1996). In contrast, results of Study One suggest that primary care physicians are motivated by secondary goals that are relatively professionally focused. Therefore, maintaining primary care physician professionality appears to be important in accomplishing the primary goal of correcting health misinformation with patients. Comparatively, when patients communicate with their health care providers, they focus on relationship-building (Imes et al., 2008). Additionally, nurses' goals for communicating with patients are more relational (Babler-Schrader & Schrader, 2011; White, 2020) than physicians as evident in this study. Because

research suggests that patients rely more heavily on establishing an interpersonal relationship with their health care provider, successfully correcting health misinformation may require primary care physicians to improve trust and relationship dynamics with their patients regardless of their own goals for the conversation.

Primary Care Physicians' Strategic Message Plans. The second research question uncovered primary care physicians' strategic message plans when correcting patient-held health misinformation. Plans determine both the verbal and nonverbal communication routes in an influence attempt (Dillard, 1990; Dillard et al., 2002) and enable goal attainment (Dillard, 2015). GPA literature posits that plans exist at two levels of abstraction (i.e., strategy-level plans, tactic plans; Dillard, 1990). In Study One, the majority of primary care physician responses were representative of tactical plans as they were "instructions for producing smaller units of behavior such as actual utterances" (Dillard, 1990, p. 69). In addition to these levels of abstraction, goal-oriented plans are also often retrieved from memory from prior, similar communication encounters (Bylund et al., 2012). The qualitative data in Study One revealed context-specific, tactical verbal and nonverbal communication plans primary care physicians retrieved from their memory from prior conversations with their patients about health misinformation. The plans primary care physicians used to inform their communication behavior highlighted the importance of patient-provider immediacy, willingness to listen, and clarification when planning to communicate about health misinformation.

First, several emerging themes from primary care physician responses were representative of verbal and nonverbal immediacy and relationship-building strategies. Immediacy is described as the perception of approachability and psychological closeness (Ellis et al., 2016) and is associated with a greater relational connection between health care providers

and their patients (Kreps & Neuhauser, 2013). Interestingly, individuals devise plans to pursue both primary and secondary goals (Dillard, 1990), however, the goals identified in Study One were not relationally focused. Specifically, primary care physicians reported both verbal (e.g., positive tone, empathetic speech) and nonverbal immediacy (e.g., eye contact, physical touch, sitting down face-to-face with patients) plans when correcting their patients in an attempt to build mutual trust and respect. Physician demonstration of both verbal and nonverbal immediacy is associated with key patient outcomes, including greater attention to the physician's recommendations, satisfaction, affinity towards their physicians, and motivation to comply (Hildenbrand, 2022). Importantly, immediate tones such as empathy and affirmation are associated with the successful correction of health misinformation (Oz et al., 2018; Tully et al., 2020). Therefore, immediacy behaviors appear to be essential in building patient-provider relationships and encouraging patients to talk with their physician about anything, including what may be incorrect health information.

Primary care physicians also reported strategic message plans to listen to their patients when communicating about health misinformation. Primary care physicians exhibited a willingness to listen to their patients both verbally (e.g., asking questions, providing affirmations) and nonverbally (e.g., eye contact, nodding, limiting distractions). Specifically, planning to listen to patients is complementary to the secondary goal of conversation management (i.e., impression management and conversation flow) which primary care physicians reported being related to their primary goal of correcting patient-held health misinformation. Additionally, listening, particularly non-judgmental listening, improves patient-provider relationships (Kreps, 1988) and reassures patients that their perspective is valid, and their concerns have been heard (Berman & Chutka, 2016). Health care providers exhibiting

nonjudgmental listening may "reduce conflict, decrease physical pain, and foster emotional healing" (McCann et al., 2019, p. 477). All of these outcomes may be important in combatting health misinformation, specifically lessening conflict in communication. Lastly, Southwell et al. (2020) suggested increasing listening capacity as an important strategy for health care professionals to implement when addressing patient beliefs in health misinformation.

In addition to relationship-building strategies such as immediacy and willingness to listen, primary care physicians also noted goal-oriented plans to clarify patient-provider communication. When correcting health misinformation, primary care physicians reported both verbal (e.g., summarizing, limiting jargon, articulating clearly) and nonverbal (e.g., presenting visual aids) communication plans. Previous literature supports the importance of information clarity in correcting health misinformation (Lewandowsky et al., 2012; Seifert, 2002). Medical schools, to varying degrees, include communication skills programs that emphasize speaking in plain language to patients to improve understanding and adherence to recommendations (Makoul, 2001; Sagi et al., 2021). The "plan" of clearly conveying information to patients aligns with the secondary goal of identity management, as the principles and values of a physician is to "first do no harm" as stated in the Hippocratic Oath. Additionally, low health literacy (i.e., the inability to comprehend and use medical information to make healthy decisions; Aldoory, 2016) and being health misliterate (Krishna & Thompson, 2021) are both associated with belief in health misinformation (Krishna & Thompson, 2021; Scherer et al., 2021). Notably, as evidenced in Study One results, physicians acknowledge the importance of communicating complex scientific information using clarifying verbal and nonverbal strategies when correcting patient-held health misinformation.

Primary Care Physicians' Communicative Action. Research question three elicited primary care physicians' " action " messages in correcting their patients' health misinformation. Action is the purposeful communicative behavior an individual enacts to achieve a goal (Dillard, 1990; Dillard & Schrader, 1998). GPA literature suggests that communicative behaviors (i.e., action) are context-specific (Dillard, 1990; Dillard & Schrader, 1998). Five "action" themes specific to the context of physicians correcting patient-held health misinformation emerged from Study One results, including scientific evidence-based explication, recommendations for evaluating health-related information and sources, emotional and/or relationship-building appeal, simple correction, and disregard/judgment.

The majority of primary care physicians in Study One provided a scientific evidence-based explication or recommendation for evaluating health-related information and sources when correcting their patient's health misinformation. A factual approach is unsurprising as physicians are taught to assess everything scientifically from the very beginning of medical school. Lewandowsky et al. (2012) recommended reinforcing the correct facts, and Chan et al. (2017) suggested messages should be well-argued and sufficiently detailed when correcting health misinformation. Furthermore, van der Meer and Jin (2020) found that "a detailed counter-message is crucial to help people develop a new narrative and mobilize them in terms of taking preventative actions" (p. 568). Physicians are also taught to fix medical problems by educating the patient and/or providing them with necessary resources. Research suggests that information from credible sources is important for correcting health misinformation (Vraga & Bode, 2017). However, little is known about the importance of primary care physicians' recommendations for evaluating health information and sources in correcting health misinformation. Education for

health-related information-seeking behaviors may play an essential role in combatting belief in and spread of health misinformation.

Primary care physicians also reported using emotional and/or relationship-building appeal when correcting health misinformation. In these corrective influence appeals, physicians employed strategies such as sharing anecdotes and personal experiences. Storytelling was evident throughout these corrective influence messages. However, there are mixed findings as to whether the use of narrative messaging is successful in correcting health misinformation (Huang & Wong, 2020; Sangalang et al., 2019; Shelby & Ernst, 2013). Literature suggests, though, that establishing trustworthy patient-provider relationships may play a role in addressing patient-held health misinformation (Arora et al., 2020). As a result, emotional and relationship-building appeals may be necessary for correcting health misinformation as this communicative behavior bolsters the perceived trustworthiness of the physician. Importantly, primary care physicians – particularly pediatricians – see patients regularly and have greater opportunities than other medical specialties to build trust and relationships with patients over time.

Lastly, primary care physicians reported using strategies of simply correcting their patients with no explanation (i.e., simple correction) and exhibiting disregard and judgment towards their patients (i.e., disregard/judgment) when correcting patient-held health misinformation. Research suggests these two types of communicative action may be ineffective in correcting health misinformation and may even induce reactance (i.e., backfire effects; Brehm, 1966; Brehm & Brehm 1981; Lewandowsky et al., 2012). Although simplicity and clarity are important in addressing health misinformation (Lewandowsky et al., 2012), providing no explanation at all does not sufficiently correct health misinformation (Ecker et al., 2019; Roozenbeek & van der Linden, 2022). Implying something is inaccurate without clarification

does not allow an individual to successfully update their mental model with new correct information (Johnson & Seifert, 1994; Pluviano et al., 2017). Additionally, open-ended responses from the physicians in Study One who communicated disregard/judgment during the conversation with their patient about health misinformation revealed communication that was disrespectful, dismissive, and often condescending. These types of demeaning communicative behaviors risk reactance from their patients which would induce unintended results such as increased support for the incorrect health information (Lewandowsky et al., 2012; Nyhan & Reifler, 2010).

Important to note is that when communicative action does not accomplish the intended goal (e.g., correcting patient-held misinformation), individuals often reevaluate their plans and action, and then engage in different future behaviors (Dillard, 1990); therefore, a primary care physician who realizes that these types of corrective strategies are ineffective can adjust their future behavior accordingly. However, if a primary care physician is unaware of the fallacy in their approach and assume they have corrected their patient's health misinformation successfully, when in fact they have not, they may not reevaluate their communicative behavior. In Study One, primary care physicians rated their efficacy in attempting to correct their patient's health misinformation relatively high ($M = 5.77$, $SD = 1.01$) on a scale of 1 (*strongly disagree*) to 7 (*strongly agree*). Therefore, there may be a disconnect between the use of detrimental communicative behaviors (i.e., simple correction, disregard/judgment) and perceived efficacy of these strategies.

Study Two

The fourth research question experimentally tested different types of corrective influence message strategies to determine whether they elicited differences in perceived patient outcomes

(i.e., source credibility, patient satisfaction, future communication with one's primary care physician, and intentions to share online health information with one's primary care physician). Additionally, analyses accounted for individuals' levels of health literacy and trust in their primary care physician. Each type of corrective influence message was designed to reflect effective "action" themes (i.e., scientific evidence, evaluation recommendation, emotional appeal) that emerged from Study One and checked for validity by a board-certified medical doctor and registered nurse. The corrective influence messages were also created to correct health misinformation about vaccine safety and toxicity. For the final analysis, however, only two of the corrective influence messages (i.e., scientific evidence, emotional appeal) were used due to issues with message comparisons. Results of Study Two indicated no significant difference between corrective influence message types on any of the perceived patient outcomes.

Although results showed no significant difference between corrective influence message types, for both scientific evidence and emotional appeal influence strategies, participants perceived their primary care physicians as credible, were satisfied with the encounter, and intended to communicate with and share online health information with their physicians. For comparison, in previous research, approximately only one-third of participants report talking to their physicians about health information they have found online (Diaz et al., 2002; Fox & Rainie, 2002; Imes et al., 2008). Additionally, recent research assessed patient satisfaction with medical care including one study which identified student satisfaction of their college health care providers ($M = 2.61$; Gyamfi et al., 2021). Lastly, very limited prior research has examined patient perceived source credibility of physicians, however results from this research were comparable to other studies exploring more light-hearted patient-provider conversations than correcting health misinformation. For example, one study analyzed source credibility based on

medical orientation (competency: $M = 5.35$; trustworthiness: $M = 4.86$; caring: $M = 5.04$; Brann, 2005) and another study examined physician use of humor with their patients (competency: $M = 5.73$; trustworthiness: $M = 5.65$; caring: $M = 5.39$; Wrench & Booth-Butterfield, 2003).

Favorable perceptions of important patient outcomes are key to the correction of health misinformation, as evidenced in previous research. As mentioned in Chapter I, source credibility is important in successfully correcting health misinformation (Sui & Zhang, 2021; Vraga & Bode, 2017) and perceived source credibility is defined as being competent, trustworthy, and exhibiting goodwill (McCroskey and Teven, 1999). Participants who read both the scientific evidence (competency: $M = 5.31$; trustworthiness: $M = 4.98$; goodwill: $M = 5.31$) and emotional appeal messages (competency: $M = 5.25$; trustworthiness: $M = 4.93$; goodwill: $M = 5.11$) rated the primary care physicians as being relatively credible across all three dimensions of credibility. Additionally, the ratings were consistent across message type and source credibility dimensions. One specific research study noted the importance of both perceived information quality and perceived source credibility in the perceived credibility of health misinformation rebuttals (Sui & Zhang, 2021). This perception is advantageous as primary care physicians are generally perceived as credible, as evident in Study Two's results, and trained and educated to communicate scientific information. Furthermore, many individuals routinely use the Internet and social media to find health information where inaccurate information is prevalent (Suarez-Lledo & Alvarez-Galvez, 2021). Although this research study examined face-to-face communication between patients and providers, it is also imperative, as suggested by Bautista et al. (2021), that physicians and medical professionals be more active in correcting health misinformation on these mediated communication platforms (e.g., privately posting and sharing credible evidence-based health information on social media platforms).

In addition to source credibility, participants reported their perceived satisfaction of medical care in response to the specific corrective influence message they each received. Patient satisfaction is not only an important indicator of health care quality (Prakash, 2010) but also an indicator of whether individuals will continue to see the same physician over time (Platonova et al., 2008). Additionally, research suggests relational communication influences patient outcomes more than the quality of education, and physician communication skills are mediated by patient satisfaction (Bartlett et al., 1984). Primary care, in particular, is reliant on patient satisfaction as the health encounter is generally not an emergency, and often individuals have many choices for their primary medical care. Importantly, in Study Two, participants rated patient satisfaction positively across both types of messages (scientific evidence: $M = 4.82$; emotional appeal: $M = 4.78$). Given that the goal of both the scientific evidence and emotional appeal messages was to correct patient-held health misinformation, patients must be satisfied with the medical care they receive from their physician so they will adjust their beliefs after these difficult conversations about health misinformation.

Lastly, the participants read each corrective influence message and then reported their future communication intentions. Specifically, participants were asked whether, in the future, they intended to communicate with and/or share information they found online about vaccines with their physicians. Both of these measures identify whether individuals will continue the conversation after being corrected by their primary care physician. Often, belief in health misinformation is continued even after correction (Walter & Tukachinsky, 2019), and research suggests multiple corrections may be necessary (Vraga & Bode, 2017). As mentioned in Chapter I, Imes et al. (2008) used GPA to better understand why patients refrained from discussing online health information with their health providers and found trust and relationship comfortability as

the main factors. Specifically, many patients did not share information they found on the Internet due to a deficiency in the patient-provider relationship because of prior provider condescending communication, lack of comfortability and trust, concerns about what the physician would think of them, and a lack of time (Imes et al., 2008). Study Two results revealed that compared to the other reported patient outcomes (i.e., source credibility, patient satisfaction), communication intention was rated slightly lower by participants (scientific evidence: $M = 4.45$; emotional appeal: $M = 4.56$), but ratings still indicated participants' willingness for future communication with their physician after being subject to these corrective strategies. Although participants reported a limited amount of time with their physicians during a routine doctor's visit ($M = 17.84$ minutes), this provides an opportunity for physicians to keep open the line of communication about health misinformation.

Theoretical Implications

The results of the two studies in this dissertation extend literature on health misinformation and GPA in three significant ways. First, the current research offers a theory-driven, communicative approach for strategically correcting health misinformation. Health misinformation research is primarily interdisciplinary and atheoretical (Zhao et al., 2021) and very few studies approach this uniquely communicative issue with an applicable theory considering both the sender and receiver perspectives (Janze & Risius, 2017; Zhao et al., 2021). Additionally, many research studies examining health misinformation lack applicable and tested strategies to combat the spread of and belief in health misinformation (Arora et al., 2020; Chou et al., 2020, Trethewey, 2020; Wang et al., 2019), including employing health care providers as the source of the correction (Bautista et al., 2021; Sturgill, 2021; Southwell et al., 2020). The results of this dissertation substantiate the role that communication theory and research should

play in addressing this critical public health issue; specifically, in examining how to combat this information epidemic communicatively via primary care providers' use of corrective influence messages. Taken together, the results of the two studies of this dissertation illustrate the importance of testing realistic influence messages that primary care physicians use to correct patient-held health misinformation and, furthermore, assessing the correction's effectiveness for significant patient outcomes.

Second, this dissertation applies GPA to the correction of health misinformation, extending the utility of this communication theory to a novel health context as well as a new type of influence messaging (i.e., corrective). GPA literature has previously explored health contexts (Bylund et al., 2012; Imes et al., 2008; LaBelle & Ball, 2019; Sabee et al., 2012; Trost & Yoshimura, 2006; Wilson et al., 2015). However, this is the first study to use the theory to explore the context of corrective influence messages. The central focus of GPA is the process of creating and implementing goal-oriented influence messages (Dillard, 1990), and Study Two experimentally tests a new type of influence message (i.e., corrective) in which the goal of the communicative interaction is for an individual to correct another person. Furthermore, in support of the application of GPA to health contexts, the results of this study illustrate its utility in exploring goal-oriented influence messages focused on health care professionals correcting their patients in an interpersonal encounter.

Third, this dissertation takes a unique, mixed-methodological approach to assessing the GPA process by qualitatively uncovering "action" messages and using those results to create and quantitatively test the efficacy of corrective influence messages. Prior GPA research has used primarily qualitative methodologies to uncover individuals' overarching conversational goals that are specific to particular contexts (Imes et al., 2008; LaBelle & Ball, 2019; Sabee et al.,

2012). However, this is the first study to elicit "action" messages by asking individuals exactly what they said (i.e., action), rather than the reasoning (i.e., goals) for the communicative influence encounter. Importantly, this methodology for uncovering "action" messages allows for an in-depth look at context-specific communication behaviors (Canary et al., 1993; Tracy, 2019) rather than relying on previously discovered goals, as well as the creation and evaluation of context-specific communication messages that individuals enact to attain a goal (Dillard, 1990).

Moreover, by eliciting message strategies directly from primary care physicians, this unique methodological approach produced realistic templates to test for message efficacy. Notably, previous research emphasizes the importance of testing realistic messaging tailored to specific contexts for more generalizable and applicable results (Slater et al., 2015). In this dissertation, corrective influence messages constructed from Study One qualitative results were checked for validity by a board-certified doctor and registered nurse and tested experimentally in Study Two. In contrast, prior GPA literature is limited by simply identifying different parts of the goal-oriented communication process (i.e., either goals, plans, or action) without experimentally testing the communicative behavior (i.e., action) (e.g., Henningsen et al., 2013; Sabee et al., 2012). The experimental design of Study Two allowed meaningful inferences (e.g., patient outcomes) to be drawn from different types of corrective influence messages (e.g., scientific evidence, evaluation recommendation, emotional appeal).

Although this dissertation provided a unique methodological approach to assessing the process of goals, plans, and action for the context of correcting patient-held health misinformation, the research revealed a disconnect between conceptualization and operationalization of GPA theoretical constructs. Specifically, GPA explicates plans as the verbal and nonverbal mental representation of influence messages intended to be implemented in

the communicative action to attain a specific goal (Dillard, 2015). In application, this is problematic as communicative action is generally described as solely the verbal messaging an individual implements in the influence attempt (Coffelt, 2018; LaBelle & Ball, 2019). For example, in this research, "action" was described as the messaging primary care physicians communicate to their patients to correct health misinformation. However, in Study One many physicians also described nonverbal strategies (e.g., eye contact, head nodding, body positioning) within their plans that were not included within the testing of corrective influence messages in Study Two. Future GPA research would benefit from observational research as well as testing communicative action using videos to incorporate both verbal and nonverbal aspects of the influence attempt.

Practical Implications

In addition to the theoretical implications for GPA and health misinformation literature, the results of this dissertation provide practical implications for the viable role of primary care physicians in correcting health misinformation. The rise in the prevalence of health misinformation is a significant public health threat (The U.S. Surgeon General's Advisory on Building a Healthy Information Environment, 2021) but current health misinformation research lacks practical strategies for effectively combatting this infodemic (Dan & Dixon, 2021; Melki et al., 2021). Although health care professionals have previously been suggested as instrumental in correcting health misinformation (Sturgill, 2021; Southwell et al., 2020), limited studies examine this interaction (Bautista et al., 2021). The current results suggest primary care physicians may be influential in correcting patient held-health misinformation as evident in the positive patient outcomes in response to corrective influence messages. This finding is important given that primary care physicians are well respected and trusted by patients (Funk & Gramlich, 2020;

Platonova et al., 2008) and are able to build relationships with their patients over time (Dugdale et al., 1999), providing opportunities for conversations with patients about health misinformation.

Furthermore, the corrective influence messages that were tested for realism, believability, and validity came directly from primary care physicians' open-ended responses, suggesting the feasibility of an intervention in this context because many primary care physicians already employ these effective corrective influence messages. Moreover, both corrective influence message types (i.e., scientific evidence, emotional appeal) were effective in terms of key patient outcomes in this dissertation. Therefore, both types of corrective influence messages can be used by primary care physicians when correcting patient-held health misinformation. Since some primary care physicians already implement either scientific evidence or emotional appeal corrective influence messages, it is advantageous for the physicians to continue to implement one of these strategies or choose the message strategy that best fits their style of patient communication.

Along these lines, results could be used to educate primary care physicians on which corrective influence message strategy to employ when correcting health misinformation (i.e., scientific evidence, emotional appeal). In this dissertation, these corrective influence messages were perceived as effective in terms of key patient outcomes related to correcting health misinformation, implying that effective corrective messaging may be helpful in maintaining physician credibility as well as keeping patients satisfied and communicating with their physician. As such, primary care physicians should include scientific evidence-based explication and/or emotional appeals within their corrective messaging. For example, to correct health misinformation that vaccines contain toxic ingredients, physicians could employ a scientific

evidence corrective influence message by explaining that vaccine ingredients are not harmful in low levels (e.g., "formaldehyde is produced at higher rates by your own metabolic systems"). Not only does the message correct the idea that vaccines contain toxic ingredients, but it explains "why." If an individual believes the false information that vaccines are toxic, then a scientific evidence-based correction helps to update the patient's mental model (i.e., "mental representation of unfolding events," Walter & Tukachinsky, 2020, p. 158) with new and correct health information (Ecker et al., 2011; Lewandowsky et al., 2012). Therefore, primary care physicians will be most effective in correcting health misinformation when offering a coherent, detailed scientifically based explanation to their patients.

In addition to scientific evidence-based messages, physicians can employ emotional and/or relationship-building appeal messages to correct health misinformation by incorporating phrases like "I want to personally reassure you that I care" and "I have personally told all my family and friends that vaccines are safe and effective." These messages express care for the patient using examples of personal experience and anecdotes. Research is mixed on the effectiveness of using narrative (i.e., storytelling) to correct health misinformation (Huang & Wang, 2020; Sullivan, 2019); however, sharing personal stories may simply help primary care physicians build trust and relationship with their patients to be able to have these difficult conversations. Additionally, research suggests emotions (e.g., fear, anxiety) may impact health misinformation processing (Chou et al., 2020) and the acceptance of health misinformation (Li et al., 2022). Thus, negative heightened emotions may provoke belief in health misinformation and disregard for the corrective message. Therefore, emotional appeal corrective influence messages tap into the relational aspect of correcting health misinformation and primary care physicians can

use this strategy to their advantage when trying to build a relationship with their patients to correct health misinformation.

Limitations

Although the results of this dissertation provide important theoretical and practical implications, the two studies were not without limitations. The first limitation is the unsuccessful manipulation of the evaluation recommendation message category implemented in Study Two. Although the pilot testing results highlighted that participants could differentiate between the evaluation recommendation messages and both the scientific evidence and emotional appeal messages, and participants agreed the evaluation recommendation messages were alike, similar results did not emerge for the manipulation check of the final data collection. Specifically, Study Two participants perceived the evaluation recommendation messages as being significantly different on the evaluation recommendation manipulation check item. Therefore, the evaluation recommendation messages were not collapsed into one category and furthermore excluded from final analyses.

Additionally, there was no objective benchmark comparison (e.g., control message, ineffective corrective influence message) to objectively conclude by comparison that the messages used in Study Two were effective; rather, external benchmarks were necessary to determine the extent to which the scientific evidence and evaluation recommendation messages were effective. Although excluding the simple correction and disregard/judgment strategies was intentional because these types of corrections may induce undesirable results (e.g., backfire effects, Lewandowsky et al., 2012; increased strength in original beliefs, Nyhan & Reifler, 2010), creating influence messages around these two distinctly ineffective "action" themes may have provided a suitable comparison within the same sample of participants. Future research

could use the two ineffective "action" themes to create messages that serve as comparison corrective influence messages.

Second, the two studies in this dissertation addressed a dyadic conversation separately rather than direct observation of the interaction. In Study One, primary care physicians were asked to recall how they corrected patient-held health misinformation, explicitly asking what they said to their patients. There is the possibility of recall bias as they were allowed to recount any health misinformation conversation they had within the previous 12 months. Therefore, the physicians may not fully remember what they said to their patient to correct health misinformation, and their responses in Study One may not be an accurate reflection of the communication in the influence encounter. Additionally, primary care physicians reported high efficacy in changing the minds of their patients ($M = 5.77$, $SD = 1.01$), which may indicate bias of inflated effectiveness as research suggests the difficulty and complexity of correcting health misinformation (Arora et al., 2020; Chou et al., 2018). Direct observation of a primary care physician correcting patient-held health misinformation would have offered a unique evaluation of the conversation in real-time including the evaluation of nonverbal and verbal patient responses. However, the use of an anonymous survey methodology allowed for honest patient reactions that they may not otherwise exhibited in a face-to-face encounter while still taking into consideration both sender (i.e., physician) and receiver (i.e., patient) perspectives.

The third limitation was the representation of individuals in Study Two. Overall, reported demographics were diverse except for biological sex and ethnicity. Specifically, participants were primarily White/Caucasian (78%) and female (60%). The results of this dissertation are important to consider in light of this limitation because ethnicity may play a role in exacerbating the spread of and belief in health misinformation. Minority individuals, such as Black/African

American populations, are disproportionately impacted by health disparities (Jaiswal & Halkitis, 2019) and have heightened medical mistrust due to historic abuse from the scientific community (Freimuth & Quinn, 2004). Research suggests medical mistrust is furthermore associated with increased exposure to and belief in health misinformation (Chou et al., 2020; Tan & Brigman, 2020). It is important to include voices from a more racially diverse sample to understand the health disparities (e.g., medical mistrust) impacting minority populations' belief in health misinformation.

In addition to medical mistrust, another health disparity, low health literacy, is associated with belief in health misinformation (Krishna & Thompson, 2021; Scherer et al., 2021). Study Two revealed relatively high scores on perceived health literacy ($M = 5.59$, $SD = 0.97$), and high health literacy is associated with less belief in health misinformation (Krishna & Thompson, 2021). Inflated perceptions, however, may be due to social desirability bias as well as limitations of currently available instrumentation for assessing health literacy (i.e., evaluating perception over objective health literacy). Whatever the reasoning, inadequate perception of health literacy is problematic if individuals believe they are more literate than they actually are and continue to believe health misinformation without realizing it is inaccurate.

Future Directions

The findings of this dissertation provide important directions for future research. One opportunity is to explore additional corrective influence strategies. For example, there were two corrective influence messages that were not used in this dissertation (i.e., simple correction, disregard/judgment) because they were presumed ineffective based on prior literature (Lewandowsky et al., 2012), yet could be further examined. For example, research suggests that simple corrections need further explanation to successfully correct an individual's belief in

health misinformation (Ecker et al., 2019; Roozenbeek & van der Linden, 2022), and future research could explore how much explanation is necessary to successfully correct health misinformation.

In addition to exploring other corrective influence strategies, future research should explore different patient outcomes and characteristics that may be important in the reception of health misinformation correction. For example, specific health behaviors (e.g., going to routine doctor check-ups) may be important in determining if there is a greater association between detrimental health behaviors (e.g., avoidance of preventative health screenings) and belief in health misinformation. It is also important to explore additional individual characteristics (e.g., medical mistrust, ethnicity, socio-economic status) that may increase vulnerability and susceptibility to the spread of and belief in health misinformation and other strategies to reach these populations. For example, research on strategies to combat health misinformation should explore other sources (e.g., public educators, social workers) besides primary care physicians to change the minds of individuals with increased medical mistrust. If individuals do not trust medical professionals, it will be necessary to find trusted individuals in their community to correct health misinformation, otherwise individuals will not believe the correction.

Another direction for additional research is to explore training procedures for primary care physicians and other health professionals in primary care to successfully correct beliefs in health misinformation. It is evident that primary care physicians routinely have these conversations with their patients, as only three percent of all surveyed participants in Study One indicated they had not had a conversation about health misinformation with their patients in the previous 12 months. This dissertation supports the efficacy of three commonly used corrective influence messages (i.e., scientific evidence, evaluation recommendation, emotional appeal) that

could be implemented in training procedures for primary care physicians. Additionally, training primary care physicians rather than other health professionals may be an effective strategy as currently, individuals in the United States are losing trust in health professionals and organizations (Read et al., 2021). Yet, Study Two's results discovered participants generally trust their primary care physicians ($M = 5.32$, $SD = 1.28$). Given that primary care physicians are typically trusted and routinely have conversations about health misinformation with their patients, selecting primary care physicians to correct patient-held health misinformation presents an excellent opportunity to explore training methods.

Conclusion

Correcting health misinformation is challenging, and very few successful strategies exist to stop the detrimental effects of the spread of and belief in health misinformation (Lewandowsky et al., 2012; Swire-Thompson & Lazer, 2020; Walter & Tukachinsky, 2019). The results from this study approach the correction of health misinformation communicatively and theoretically. The collective findings of this dissertation solidify the importance of testing realistic health misinformation correction influence messages from credible sources (i.e., primary care physicians) for the relative effectiveness of the different strategies. The findings of the two studies also identify two unique corrective influence strategies (i.e., scientific evidence, emotional appeal) for primary care physicians to use in the future to combat patient-held health misinformation. Ultimately, the scientific evidence and emotional appeal corrective influence messages elicited positive patient outcomes, including perceived source credibility, patient satisfaction, and intention to communicate to and share online health information with primary care physicians. Lastly, this dissertation demonstrates the applicability of GPA within health contexts, including the exploration of corrective influence messages.

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APPENDICES

Appendix A: Study One Recruitment Script

The purpose of this study is to examine conversations about health misinformation between patients and primary care physicians.

To participate in this research, you must be 18 years of age or older, a resident of the US, and a current primary care physician who routinely sees patients.

Participation in this study involves taking a 15-minute anonymous, online survey which asks you to recall a difficult conversation you have encountered about health misinformation with a patient.

To read the consent form and indicate your consent to participate in the study, please click here:
[Qualtrics survey link will go here]

If you have any questions, please contact Tayah Wozniak, MPH at twozniak@chapman.edu or Hannah Ball, Ph.D. at hball@chapman.edu (School of Communication, Chapman University). Alternatively, you can call 714-516-5185 and ask to speak to either of us.

Appendix B: Study One Recruitment Post

We want to better understand how physicians talk with their patients about health misinformation.

PRIMARY CARE PHYSICIANS NEEDED FOR A HEALTH MISINFORMATION RESEARCH STUDY

Participation involves a one time anonymous survey that will take about 15 minutes to complete. To participate you must be 18+ years of age or older, living in the United States, and a primary care physician who sees patients regularly. Primary care includes **family medicine, internal medicine, pediatrics, obstetrics and gynecology, and geriatrics.**

If interested, please use the following QR code or link below.

https://chapmanu.co1.qualtrics.com/jfe/form/SV_cA3tNSYToVjc4Zg

Chapman University
IRB-22-76
Approved on 12-10-2021

Please contact Tayah Wozniak (twozniak@chapman.edu) with any questions.

Appendix C: Study One Survey Questionnaire

1. Informed Consent
2. Inclusion Criteria Questions:
    a. I currently live in the U.S. Geo-Filter via Qualtrics
    b. I am 18+ years old. Yes.. continue. No.. end survey.
    c. Are you a current primary care physician? (e.g., current doctors in the fields of family medicine, internal medicine, pediatrics, obstetrics and gynecology, or geriatrics) Yes.. continue. No.. end survey.
    d. I currently see patients on a regular basis. Yes.. continue. No.. end survey.

Health misinformation is defined as misleading and false health information or facts that lack scientific support and evidence. Health misinformation does not refer to situations where individuals are confused or undecided about health information or medical recommendations.

    e. I have had a conversation with a patient about health misinformation within the previous 12 months. True.. continue. No.. end survey.

We are interested in a specific time you attempted to correct and/or change the mind of a patient when they shared health misinformation with you.

As a reminder, health misinformation is defined as misleading and false health information or facts that lack scientific support and evidence. Please note that health misinformation does NOT refer to situations where individuals are confused about or haven't made a decision about health information or medical recommendations.

Please type out the details of your most recent and successful conversation that you had about health misinformation with a patient in the previous 12 months. How did you correct health misinformation with this patient? Specifically, what did you say during the conversation as best you can recall? [Essay box]

Based on the conversation you just wrote about, please answer the following question to the best of your ability.

1. I was effective in my attempt to correct my patient's health misinformation. SD→SA
2. My patient was receptive to my correction of their health misinformation. SD→SA
3. My patient was health literate. SD→SA
4. What was your patient's age?
5. What was the ethnicity of your patient?
6. What was the gender identity of your patient?
7. The health misinformation topic I discussed with my patient was about...
    a. Medication
    b. Exercise and Nutrition
    c. Cancer
    d. Epidemics and Pandemics
    e. Vaccinations

f. Tobacco Use
g. Other (please specify): _____

Please be as specific as possible and write out both verbal (speaking rate and fluency, vocal variety and volume, and articulation) and nonverbal (eye contact, posture, gestures, and facial expressions) strategies you used to execute correction of health misinformation with your patient. [Essay box for both verbal and nonverbal strategies]

Thinking about the conversation you had with a patient about health misinformation, please answer the following questions to the best of your ability.

Primary Goal

1. In this conversation, it was very important to me to correct my patient's health misinformation.
2. I was very concerned about correcting health misinformation in this conversation.
3. I really didn't care that much about correcting health misinformation with this patient.
4. The outcome of this conversation about health misinformation had important professional consequences for me.

Secondary Goal: Identity

1. In this conversation, I was concerned with not violating my own ethical standards.
2. In this conversation, I was concerned about maintaining my own ethical standards.
3. I was concerned about being true to myself and my values.
4. I wanted to behave in a mature, responsible manner.
5. I was not concerned with sticking to my own standards.

Secondary Goal: Conversation Management

1. I wanted to make a good impression in this conversation.
2. I wanted to maintain a good impression in this conversation.
3. I was very conscious of what was appropriate and inappropriate in this conversation.
4. I was concerned with putting myself in a "bad light" in this conversation.
5. I didn't want to look stupid while trying to correct my patient.

Secondary Goal: Relational Resource

1. I was not willing to risk possible damage to our patient-provider relationship in order to correct them.
2. Correcting my patient was more important to me than preserving our relationship.
3. I didn't really care if I made my patient mad or not.

Secondary Goal: Personal Resource

1. My patient could have made things very bad for me if I kept on correcting them.
2. My patient might have taken advantage of me if I tried too hard to correct them.
3. I was worried about the threat to my safety if I pushed the issue.

Secondary Goal: Affect Management

1. In the conversation, I avoided saying things which might have made me apprehensive.
2. This conversation had the potential for making me nervous and uncomfortable.
3. I was afraid of being nervous in this conversation with my patient.
4. I avoided stating things which might have made me nervous.

[demographics block]

1. What is your job title?
2. How long have you been working in a health care setting?
3. What is your specialty area?
    a. Allergy and immunology, anesthesiology, dermatology, diagnostic radiology, emergency medicine, family medicine, internal medicine, medical genetics, neurology, nuclear medicine, obstetrics and gynecology, ophthalmology, pathology, pediatrics, physical medicine and rehabilitation, preventive medicine, psychiatry, radiation oncology, surgery, urology, Other (please specify): _____
4. Which one of these options best describes your current employer?
    a. Government Funded Hospital | Non-For-Profit Hospital | For Profit Hospital | Private Practice | Non-Profit Organization | Other (please specify): _____
5. What is your current age?
6. What is your ethnicity?
7. How do you currently describe your gender identity?
    a. Male/Female/Transgender/I do not identify as male, female, or transgender/I prefer not to answer
8. What state do you currently work or practice health care?
9. How would you describe your political affiliation?
    a. Far-Left, Democrat, Moderate, Independent, Republican, Far-Right, Other, please list _____
10. On average, how much time (in **minutes**) do you get to speak one-on-one with each patient during an appointment or doctor's office visit?

Misinformation check:

1. I believe FDA approved vaccines are safe. SA→SD
2. I believe FDA approved vaccines are effective. SA →SD
3. I routinely suggest holistic or naturopathic medicine (e.g., essential oils) to treat ailments. SA→SD

Appendix D: Study One Plans Codebook

RQ2: What are primary care physicians' strategic message plans when correcting patient-held health misinformation?

Code	Theme	Description	Examples
1	Vocalics or Paralanguage	Strategic message plans that alter vocal characteristics of communication. These messages typically include variations in pitch, rate/pace, volume, vocal variety, and rhythm.	P58: "I spoke very slowly and at a high enough tone for him to hear me." P90: "I tried to speak slowly" P83: "As to specific verbal strategies, I tend to speak slower when I need to emphasize something that I feel is important."
2	Clarity	Strategic message plans that simplify and competently communicate medical information to encourage better understanding. These messages typically include summarizing, avoidance of jargon, use of visual aids, clear articulation, and professionalism.	P96: "clear articulation and avoiding complex terms." P58: "I walked through his concerns and refuted each of his concerns with science backed literature and outcomes by showing him these outcomes on my computer screen."
3	Body Positioning	Strategic message plans that model attentiveness and relaxation through specific body language. These messages typically include facing the patient, sitting down with the patient, physical touch, and a relaxed posture.	P96: "I was sitting in a chair across the room and used simple hand gestures." P86: "siting at patient's level."
4	Listening Behavior	Strategic message plans that exhibit listening engagement through both nonverbal and verbal communication. These messages typically include gestures such as eye contact, nodding, limiting distractions and interruptions, affirmation of patient responses, and asking questions. These messages also show the doctor is understanding, nonjudgmental, and available.	P96: "I attempted to maintain eye contact." P96: "Afterwards, I asked the patient what his feelings were about this new information and if he'd be willing to remain on his anti-seizure medication."

5	Relationship-building Tone	Strategic message plans that characterize communication through attitude or emotion and seek to build mutual trust and respect with patients. These messages typically include positivity, confidence, firmness, calmness, empathy, friendliness, honesty, and assurance. These conversations are also typically casual and familial in nature.	P96: “bright and positive tone (avoiding sounding harsh, scolding, or condescending).” P68: “I used a gentle, inviting, but firm tone to make the discussion an inviting conversation and affirmed their concerns.”

Appendix E: Action Codebook

RQ3: What communicative action do primary care physicians take when correcting patient-held health misinformation?

Code	Theme	Description	Examples
1	Scientific evidence-based explication	Messages that explain and describe why the health misinformation is incorrect to patients. These messages typically communicate (a) risk/benefits, (b) facts/science/research, and/or (c) resources to correct or change the mind of patients.	P85: "Patient asked how bad the risk was of infertility with COVID vaccination. Showed the patient studies that examined this issue and demonstrated no evidence of any such risk." P32: "They felt the COVID vaccine caused Covid. I explained the pharmacology of the vaccine in an effort to show otherwise. Also showed the FDA decision memorandum where the data from the initial trial was available."
2	Recommendations for evaluating health-related information and sources	Messages that give patients advice in navigating health information seeking and identifying reputable sources. These messages typically communicate (a) the importance of finding valid information, (b) checking source credibility and reputation, (c) thinking critically, and/or (d) asking medical professionals questions about the information that is found.	P105: "Tease out exactly what the person believed and source misinformation, discussed why source was not reputable, also discussed exact study the patient was referring to and why it was not actually statistically significant." P26: "I told them about how an article that you google does not relate to the symptoms that they are having. I told them that those online articles are not always written by professionals and cannot always be trusted."
3	Simple Correction	Messages that are straightforward in nature offering a correction to the health misinformation without much detail as to why the information	P61: "I corrected the patient's perception that the COVID-19 vaccine is harmful."

		is incorrect and inaccurate. The messages offer little to no explanation and/or discussion with the patients. These messages also explain they convinced the patient, but with little explanation of how.	P9: “They believed that the COVID vaccine was killing about 100 people per day. I simply told them it was entirely inaccurate and has been given to billions.”
4	Disregard/Judgment	Messages that communicate indifference or disrespect towards patients by being dismissive or thinking negatively about their opinions, thoughts, and belief in health misinformation. These messages often come across as arrogant, patronizing, and condescending.	P29: “This patient was a 47-year-old male complaining of not trusting vaccines for COVID-19. This patient had listened to extreme views and far right news.” P13: “They didn’t believe the information about COVID-19 and end(ed) up getting sick.”
5	Emotional and/or relationship-building appeal	Messages that invoke patients to consider emotive aspects related to the effects of health misinformation. These messages utilize methods such as (a) anecdotes, (b) personal experiences, (c) fear appeals, (d) care for the patient, (e) and/or (f) building trust or rapport to correct or change the mind of patients.	P38: “They said that all physicians only cared about the money but I told them that is not true because I care and value my patients and want them to get the best care available.” P87: “I had this patient who was Jehovah's Witness, but his parents had died, and he had been adopted by a Christian family, the boy needed a blood transfusion urgently but did not want to accept it because of his religion, so I told him that there was nothing wrong and that his god would not be mad at him. In fact, He would be very happy because the boy would survive. The boy accepted it and the blood transfusion was performed, that is how I saved a life.”

Appendix F: Pilot Test Messages

Scientific Evidence #1:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. In fact, according to the FDA and the CDC, formaldehyde is produced at higher rates by your own metabolic systems, and there is no scientific evidence that the low levels of this chemical, mercury, or aluminum in vaccines can be harmful. (54)

Scientific Evidence #2:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. In fact, according to the FDA and the CDC, there are very minimal if any risks associated with vaccine ingredients. Additionally, the benefits of vaccines in preventing and protecting against severe illnesses are far greater than any risks. (51)

Scientific Evidence #3:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. In fact, according to the FDA and CDC, each ingredient in a vaccine serves a specific purpose including to provide immunity, vaccine safety and longevity, and production purposes. These ingredients are also all found in FDA approved household products and foods. (54)

Recommendation #1:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. It is important when you find health-related information online or on social media to make sure the source of information is reputable. If looking for health-related information online, it is important to use only credible sources like the CDC. (52)

Recommendation #2:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. It is important when you find health-related information online or on social media to think critically about what you read. If you are unsure about what you have discovered, it is important to ask your doctor about the accuracy of the health information. (56)

Recommendation #3:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. It is important when you find health-related information online or on social media to evaluate whether the data is supported by scientific research. It is important to check the origin of the information and whether the research was peer-reviewed or verified my professionals. (56)

Emotional #1:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. I can understand why you may be concerned about this information you found online. However, I

want to personally reassure you that I care about your health and well-being. In addition, my patients have received thousands of safe and effective vaccines. (54)

Emotional #2:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. I am happy though you decided to share this information you found online with me. I care about my patients like they are family, and I have personally told all of my family and friends that vaccines are safe and effective. (54)

Emotional #3:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. I want to put your mind at ease about this information. As with other aspects of your care, I have your best interest and overall well-being at heart. I have also had many similar conversations with other patients about vaccine safety and efficacy. (56)

Appendix G: Study Two Corrective Influence Messages

Scientific Evidence #1:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. In fact, according to the FDA and the CDC, formaldehyde is produced at higher rates by your own metabolic systems, and there is no scientific evidence that the low levels of this chemical, mercury, or aluminum in vaccines can be harmful. (54)

Scientific Evidence #2:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. In fact, according to the FDA and the CDC, there are very minimal if any risks associated with vaccine ingredients. Additionally, there is scientific evidence that the benefits of vaccines in preventing and protecting against severe illnesses are far greater than any risks. (56)

Recommendation #1:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. It is important when you find health-related information online or on social media to make sure the source of information is reputable. If looking for health-related information online, it is important to use only credible sources like the CDC. (52)

Recommendation #2:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. It is important when you find health-related information online or on social media to evaluate whether the data is supported by scientific research. It is important to check the origin of the information and whether the research was peer-reviewed or verified my professionals. (56)

Emotional #1:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. I can understand why you may be concerned about this information you found online. However, I want to personally reassure you that I care about your health and well-being. In addition, my patients have received thousands of safe and effective vaccines. (54)

Emotional #2:

There are only trace amounts of these chemicals used in some FDA-approved vaccines. I am happy though you decided to share this information you found online with me. I care about my patients like they are family, and I have personally told all of my family and friends that vaccines are safe and effective. (54)

Appendix H: Study Two Recruitment Script

The purpose of this study is to examine patient perspectives in response to correction of health misinformation by a primary care physician.

To participate in this research, you must be 18 years of age or older and living in the U.S.

Participation in this study involves taking a 15-minute anonymous, online survey which asks you to answer questions related to a message from a primary care physician about health misinformation.

To read the consent form and indicate your consent to participate in the study, please click here:
[Qualtrics survey link will go here]

If you have any questions, please contact Tayah Wozniak, MPH at twozniak@chapman.edu or Hannah Ball, Ph.D. at hball@chapman.edu (School of Communication, Chapman University). Alternatively, you can call 714-516-5185 and ask to speak to either of us.

Appendix I: Study Two Recruitment Post

Volunteers Needed

We want to hear from you!

We are interested in individuals' perceptions of their primary care doctors. Participation involves a one time anonymous survey that will take about 15 minutes to complete. To participate you must be 18 years of age or older and live in the U. S.

If interested, please use the following link or QR code below:
https://chapmanu.co1.qualtrics.com/jfe/form/SV_9XP4tJb8NnqwAYe

Chapman University
IRB-22-161
Approved on 3-9-2022

Please contact Tayah Wozniak (twozniak@chapman.edu) with any questions.

Appendix J: Study Two Survey Questionnaire

1. Informed Consent
2. Inclusion Criteria Questions:
    a. I currently live in the U.S. Geo-Filter via Qualtrics
    b. I am 18+ years old. Yes.. continue. No.. end survey.

[Trust block] SD→ SA

General Trust of Primary Care Physician

Please answer the following items about the relationship you share with your regular health provider.

1. I feel that I can trust my regular primary care physician completely.
2. I feel that my regular primary care physician does not show me enough consideration.
3. I feel that my regular primary care physician can be counted on to help me.

[Random Message Assignment block]

Ask participants to, "Imagine you found information online saying vaccines contain toxic ingredients. You decide to bring this information up the next time you go to see your regular primary care physician."

Randomly assign one corrective influence message correcting health misinformation to each participant.

Thinking about the message you just read from your primary care physician, please answer the following questions to the best of your ability.

[Manipulation Check block] SD→ SA

1. The message provided scientific evidence to explain why the health information was incorrect.
2. The message provided recommendations for finding credible health information and sources.
3. The message provided an emotional and personal response to correct the health misinformation.

[Realism block]

1. To what degree was the message you just read…
    a. Believable (1 not very believable to 7 very believable)
    b. Realistic (1 not very realistic to 7 very realistic)
    c. Easy to imagine yourself hearing this message from a primary care physician (1 not very easy to 7 very easy)
2. I have had a similar conversation with a primary care physician. SD→SA

[Perceived Believability block]

On the scales below, please indicate the degree to which you believe the message you just read from the primary care physician. Numbers "1" and "7" indicate a very strong feeling. Numbers "2" and "6" indicate a strong feeling. Numbers "3" and "5" indicate a fairly weak feeling. Number "4" indicates you are undecided or do not understand the adjective pairs themselves. There are no right or wrong answers. Only circle one number per line.

1. Agree 1 2 3 4 5 6 7 Disagree
2. False 1 2 3 4 5 6 7 True
3. Incorrect 1 2 3 4 5 6 7 Correct
4. Right 1 2 3 4 5 6 7 Wrong
5. Yes 1 2 3 4 5 6 7 No

[source credibility block]

After reading the message from the primary care physician, on the scales below, indicate your feelings about the health care provider. Numbers "1" and "7" indicate a very strong feeling. Numbers "2" and "6" indicate a strong feeling. Numbers "3" and "5" indicate a fairly weak feeling. Number "4" indicates you are undecided.

1. Intelligent1 2 3 4 5 6 7 Unintelligent
2. Untrained 1 2 3 4 5 6 7 Trained
3. Cares about me 1 2 3 4 5 6 7 Doesn't care about me
4. Honest 1 2 3 4 5 6 7 Dishonest
5. Has my interests at heart 1 2 3 4 5 6 7 Doesn't have my interests at heart
6. Untrustworthy 1 2 3 4 5 6 7 Trustworthy
7. Inexpert 1 2 3 4 5 6 7 Expert
8. Self-centered 1 2 3 4 5 6 7 Not self-centered
9. Concerned with me 1 2 3 4 5 6 7 Not concerned with me
10. Honorable 1 2 3 4 5 6 7 Dishonorable
11. Informed 1 2 3 4 5 6 7 Uninformed
12. Moral 1 2 3 4 5 6 7 Immoral
13. Incompetent 1 2 3 4 5 6 7 Competent
14. Unethical 1 2 3 4 5 6 7 Ethical
15. Insensitive 1 2 3 4 5 6 7 Sensitive
16. Bright 1 2 3 4 5 6 7 Stupid
17. Phony 1 2 3 4 5 6 7 Genuine
18. Not understanding 1 2 3 4 5 6 7 Understanding

[satisfaction block]

Please indicate on the following items below how you feel about the quality of medical care you believe you would have received after reading the message from the primary care physician. Choose just one number per response. The middle score "4" indicates you are undecided.

1. High Quality 1 2 3 4 5 6 7 Low Quality
2. Personable 1 2 3 4 5 6 7 Impersonal

3. Uncaring 1 2 3 4 5 6 7 Caring
4. Concerned 1 2 3 4 5 6 7 Unconcerned
5. Beneficial 1 2 3 4 5 6 7 Not Beneficial
6. Unsatisfactory 1 2 3 4 5 6 7 Satisfactory

[Communication Intention] SD→ SA

Based on the message you read previously from a primary care physician, please answer the following questions.

1. In the future, I intend to discuss health information about vaccines with this health care provider.
2. In the future, I will try to discuss health information about vaccines with this health care provider.
3. In the future, I plan to discuss health information about vaccines with this health care provider.

[Sharing online health information block] SD→SA

Based on the message you read previously from a primary care physician, please answer the following questions to the best of your ability.

1. I wouldn't share information I have found online about vaccines with this health care provider because I don't want to sound paranoid.
2. I wouldn't share information I have found online about vaccines with this heath care provider because I am embarrassed for searching for health information online.
3. If I mentioned something I found online about vaccines with this health care provider, they would dismiss it right away.
4. This health care provider wouldn't listen to me when I share health information I have found online about vaccines.

[health literacy block] SD→ SA

In general, please answer the following questions to the best of your ability.

1. I am capable of finding the health information that I need
2. I am capable of reading health information
3. I am capable of explaining the health information that I have learned
4. I am capable of becoming aware of inconsistent health information
5. I am capable of selecting the health information that I need
6. I am capable of judging the accuracy of health information
7. I am capable of describing my health problems to medical staff members such as physicians
8. I am capable of sharing or communicating the health information I have learned to others
9. I am capable of completing medical forms in a hospital independently
10. I am capable of directing myself to the medical department to which I should go in a hospital

Misinformation check:

4. I believe FDA approved vaccines are safe. SA→SD
5. I believe FDA approved vaccines are effective. SA →SD
6. I routinely use holistic or naturopathic medicine (e.g., essential oils) to treat ailments. SA→SD

[demographics block]

7. How old are you?
8. How do you currently describe your gender identity?
    a. Male/Female/Transgender/I do not identify as male, female, or transgender/I prefer not to answer
9. What kind of work do (did) you do?
10. What is your current annual income?
11. What is the highest level of education you have completed?
12. What is your ethnicity?
13. How would you describe your political affiliation?
    a. Democrat, Independent, Republican, Other, please list _____
14. I have health insurance. Yes/No/Unsure
15. I have been to a doctor's office appointment within the previous 12 months as a caretaker (for a friend, parent, child, etc.). This may include telehealth visits. Yes/No
16. I have been to a doctor's office appointment within the previous 12 months for myself. This may include telehealth visits. Yes/No
17. On average, how much time (in minutes) do you get to speak one-on-one with your regular health care provider during a doctor's office appointment?