UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

THE EFFECTS OF AI CONVERSATIONS ON ATTITUDES TOWARDS WEATHER AND CLIMATE SCIENCE CONSPIRACIES

A THESIS

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

MASTER OF ARTS

By MARA DAVIS

Norman, Oklahoma

2026

THE EFFECTS OF AI CONVERSATIONS ON ATTITUDES TOWARDS WEATHER AND CLIMATE SCIENCE CONSPIRACIES

A THESIS APPROVED FOR THE

DEPARTMENT OF COMMUNICATION

BY THE COMMITTEE CONSISTING OF

Dr. John Banas, Chair

Dr. Elena Bessarabova

Dr. Patrick Meirick

Acknowledgements

I would like to express my sincere appreciation and gratitude to my advisor, Dr. John Banas, for his guidance, support, and encouragement throughout the development of my thesis project. It is truly incredible how my class project proposal for his Social Influence course ultimately evolved into this thesis. Without his class, I would not have found a passion for combatting misinformation and conspiracy theories relating to my background education in meteorology. His expertise and mentorship were invaluable to shaping both this project and my growth as a researcher and communication student here at the university.

I am also grateful for my other committee members, Dr. Elena Bessarabova and Dr. Patrick Meirick. Dr. Bessarabova helped to guide me through my very first fully quantitative analysis, and I can now confidently say I can compute a repeated measures ANOVA/ANCOVA without fault. Dr. Meirick suggested thoughtful feedback and contributions to the revision process of this thesis, greatly strengthening the final work presented.

Furthermore, I want to thank the Graduate Student Senate at the university for their support in making this thesis possible. Their funding grant allowed me to recruit the participants needed to conduct this research. I am also grateful to the Department of Communication for awarding me two additional funding grants and for providing the resources, faculty support, and academic foundation over the past two years that helped shape this project.

I would like to recognize the support and encouragement of my family and friends throughout this process. Their unwavering support and engagement kept me motivated during hard times. I also cannot forget to thank my research assistantship advisor, Dr. Elizabeth Marold. While not a collaborator on this project, I have worked under her as a research assistant for the past three

years and would not be where I am as a researcher without her. Throughout my academic journey, her support, advice, mentorship, and failures she allowed me to experience have truly helped me become stronger and more confident in my work.

Finally, I want to thank all the participants who contributed their time to this study as their involvement made this research a reality.

I could not have completed this thesis without the support of all these individuals.

Abstract

This study examines the effects of artificial intelligence (AI) chatbot conversations on attitudes towards weather and climate science conspiracy theories. Although prior research suggests conspiratorial beliefs are resistant to change, emerging evidence indicates AI-mediated interactions may serve as an effective tool for debiasing misinformation and conspiracy beliefs. The present experiment recruited 220 participants, who were randomly assigned to either an experimental condition, in which they engaged in a conversation with a refutational AI chatbot about their chosen weather or climate-science conspiracy, or a control condition involving non-conspiratorial discussion topics. Participants reported their belief levels and motivation to defend those beliefs both before and after the conversation. Results revealed a significant main effect of AI-conversation for reduction in conspiratorial beliefs from pre-test to post-test, and participants in the experimental condition exhibiting greater debiasing as compared to the control group. There was no significant main effect of the AI-conversation for motivations to defend beliefs from pre-test to post-test as motivations increased significantly in the control condition and a non-significant decrease was found within the experimental condition. These findings suggest brief AI chatbot conversations may effectively reduce endorsement of weather and climate science conspiracy theories, even among individuals with pre-existing conspiratorial beliefs. However, changes in motivated reasoning processes appear more nuanced and require further investigation. Overall, this study extends existing literature by applying AI-based debiasing strategies to weather and climate science contexts, highlighting the potential of conversational AI as a tool for mitigating misinformation and improving public understanding of environmental risk.

Table of Contents

Chapter One: Introduction

In recent years, weather and climate science have become focal points of public debate, driven by discussion surrounding climate change, intensifying severe weather patterns, and the growing threats these phenomena pose to populations across the globe (Hase et al., 2021). Risk communication of these hazards becomes crucial to inform, prepare, and warn public populations with ample time in advance to protect and save lives (Casteel, 2016). With severe weather and climate topics frequently headlined across a multitude of media outlets and platforms, it is increasingly difficult to avoid exposure to misinformation, disinformation, and conspiracy theories (Lewandowsky, 2017). Whether it originates from political authorities, fake accounts, news channels, uneducated citizens, false headlines, or clickbait, everyone is susceptible to conspiracy theory misinformation (Lees et al., 2023; Vosoughi, 2018). Climate science conspiracy theory misinformation can alter the perception of risk, trust in professionals, and motivation towards preparations, which harms public safety (Morsut et al., 2022).

Conspiracy theories disseminated through media have become an increasingly prominent, and dangerous topic of discussion (Tam & Chan, 2023). The theories disseminated across media forums commonly target specific weather or climate events, climate change evidence, political agendas, weather modification operations, or disaster relief efforts. Mainstream media, social media and internet platforms supporting online discourse—TV news channels, Reddit, YouTube, TikTok, Instagram, Facebook, X, and other online sites—play a significant role in shaping misinformation dissemination and exposure (Newman et al., 2023). Most of these platforms facilitate echo-chambers of misinformation and conspiracies and support the process of illusory truth (Nguyen, 2020). To decrease the consumption and acceptance of misinformation and

conspiracy theories, scholars have suggested utilizing debiasing and debunking communication strategies (Lewandowsky, 2021; Wright, 2022).

Technologically, we have seen the introduction of artificial intelligence (AI) to people's day-to-day lives (Shin, 2024). ChatGPT and Google Gemini (internet access) currently dominate the AI assistant world in terms of usage, while emerging assistants such as Grok (X) and Meta AI (Instagram and Facebook) are rapidly expanding due to their installations within social media interfaces (Singh & Bajwa, 2026). Algorithmic technology could be beneficial for debiasing and debunking against misinformation and conspiracy theories. Despite the potential of AI to help ameliorate the acceptance of conspiracy theory beliefs, very little research has assessed the influence of AI chatbot conversations on conspiratorial and misinformation beliefs. Although scarce, findings show promise for AI models and chatbots successfully reducing initial conspiratorial and misinformation beliefs after participants engage in a short conversation on a chosen topic (Boissin et al., 2025; Costello et al., 2024; Meyer et al., 2024; Wang & Tanes-Ehle, 2023). This study aims to contribute to the conspiracy theory mitigation literature. The present experiment examines the potential of AI chatbot conversations to reduce conspiracy theory endorsement as it relates to weather and climate science as recent research on AI debiasing suggests that climate change conspiracy theories may need different approaches than other conspiracy theories for the most effective results (Wang & Tanes-Ehle, 2023).

Chapter Two: Literature Review

The increasing prominence of weather and climate science information across modern media outlets is accompanied by a parallel rise of misinformation and conspiracy theories distorting public understanding and belief of scientific risk. These conspiratorial narratives shape how individuals interpret environmental hazards and alter perceptions of source credibility, trust, and authoritative power (Barnes et al., 2007). As the public navigates complex and uncertain scientific messaging and forecasts, verification tactics and comprehension of information decreases (Zabini et al., 2016). The expansion of online discourse with digital, social, and traditional media further intensifies these dynamics by accelerating the dissemination of both accurate information, misleading claims, and conspiracies (Vosoughi, 2018). More recently, the implementation of AI technology into these emerging media forms introduces a new dimension to how individuals seek, process, and evaluate information (Glikson & Woolley, 2020). This section outlines the processes underlying conspiracy belief formation, including the influence of media, messaging, and information sources. It also examines the role of algorithmic systems in shaping susceptibility to misinformation. These dynamics are explored within weather and climate contexts, with particular attention to the role of AI as both an amplifier of misinformation and a potential tool for mitigation and debiasing.

Conspiracy Theories and Misinformation

Conspiracies and Motivated Reasoning

Weather and climate science are topics rife with misinformation and conspiracy theories (Lewandowsky et al., 2013; 2017; van der Linden et al., 2017). A conspiracy is the secret collaboration between groups to hide secrets, suppress rights, undermine institutions, and gain financial, economic, or political power over a situation (Douglas et al., 2017). Conspiracy

theories create a causal narrative of a specific event as a plan orchestrated by secret groups, organizations, or individuals, in place of a random event or natural occurrence (Uscinski & Parent, 2014). Conspiracy theory endorsement is difficult to debunk due to motivated reasoning. *Motivated reasoning* is the process where individuals engage in biased information selectively favoring their personal beliefs while actively dismissing counterevidence (Kunda, 1990). As a result, people become motivated to preserve their beliefs. The presentation of threatening evidence activates the cognitive process labeled defensive motivational reasoning. This defensive stance leads an individual to protect their pre-existing beliefs and resist counter-attitudinal information (Enders & Smallpage, 2019). Thus, when faced with counterevidence, motivations to defend those beliefs often increase as part of motivated reasoning processes (Kunda, 1990). In this study, the AI chatbot presents counterevidence that challenges participants' pre-existing beliefs, whether conspiratorial or non-conspiratorial, thereby introducing information intended to persuade against those beliefs.

The core motivations to believe in conspiracy theories are existential, social, and epistemic needs (Douglas et al., 2017). These factors lead individuals into seeking alternate explanations, information to fill knowledge gaps, and to defend and maintain their beliefs (Douglas et al., 2017). Existential motivations satisfy the need for safety, security, and control over a situation. In the conspiracy theory relating to Hurricane Helene devastating the East Coast of the United States in 2024, people believed the democratic-led US government altered the destruction path to intentionally impact republican leaning areas to prevent those voters from participating in the 2024 presidential election (Center for an Informed Public, 2024). By replacing the unpredictability of hurricane landfall forecasting with US governmental path alterations for a political agenda, individuals achieve a sense of control over the situation. Social

motivations arise from the need for social belonging, maintaining shared group identity, positive face within the in-group, and being part of a community (Douglas et al., 2017). In these contexts, an individual's social and political identities drive their reasoning for support of conspiracy misinformation statements. Politically, this is known as partisan motivated reasoning. When beliefs are driven by political stance and identities, individuals evaluate and consume information in biased ways to protect and reinforce their own political views (Enders & Smallpage, 2019). We see this reflected in one of the more popular weather and climate science conspiracy theories where climate change is a hoax fabricated by governments, institutions, and other elites to enact control over global corporations and populations on their carbon emissions (Biddlestone et al., 2022). To reinforce a shared social identity, individuals who oppose climate change and emphasize individual freedom may be more likely to adopt these conspiracy beliefs that are congruent with their existing attitudes (Kahan, 2013). Finally, epistemic motivations stem from feelings of uncertainty and anxiety in which individuals seek out explanations for situational outcomes (Douglas et al., 2017). For example, the chemtrail conspiracy theory, where people believe condensation trails left by aircraft are the US government dispersing chemicals into the atmosphere to manipulate, control, and affect both local populations and weather patterns (Jack & Panchal, 2021). Upon witnessing the odd cloud formations within the atmosphere, the explanation of chemtrails provide a simple and understandable account for the unfamiliar phenomenon which would otherwise require meteorological background to fully understand. Within the framework of conspiracy belief formation, AI chatbot interventions primarily address epistemic needs by assisting individuals in making sense of complex or uncertain information through corrective explanations and counterarguments (Banks & de Graaf, 2020). Although such interaction may indirectly influence existential needs by increasing

perceived control and may engage social identity processes when beliefs are politically or socially grounded, our study's AI chatbot mainly operates through informational and corrective mechanisms to tackle epistemic related needs.

These motivational drivers not only explain the adoption of conspiracy beliefs but also help contextualize the increasing prevalence of harmful and dangerous conspiracy theories in recent history. Even 20 years ago with Hurricane Katrina in 2005, a conspiracy emerged on the intentional destruction and implosion of the levees by authorities to cause catastrophic flooding to a historically minority area (Cordasco et al., 2007). Another conspiracy opposes the argument of climate change being anthropogenically driven given recent data trends. The conspiracy theory outlines the process of data manipulation by research scientists to favor personal propaganda outcomes (Douglas & Sutton, 2015). With the deadly Paradise, California wildfires in 2018, people claim the fires were started by directed energy weapons (DEWs), an idea applied towards the Canada 2023, Maui 2023, and Palisades 2024 fires (Doan & Delzer, 2025). These conspiracies represent only a fraction of beliefs surrounding weather and climate events, with most often emerging from underlying motivational factors leading individuals to attribute ulterior motives and causes, thereby distorting their perception of environmental risk. These altered ideas of weather and climate science could invite dangerous situations as the understanding of risk to an individual directly contributes towards their decision-making and preparedness motivations (Morsut et al., 2022).

Misinformation

An additional factor fueling environments to believe in conspiracies is misinformation. Information unintentionally shared projecting inaccurate, misleading, or false claims is labelled as *misinformation* (Vosoughi, 2018). Although misinformation and conspiracy theories both rely

on false or misleading information, they are conceptually distinct. Conspiracy theories are characterized by coherent narratives that connect multiple pieces of misinformation into a broader, causal explanation of events, often attributing intentionality to hidden actors or groups. Lewandowsky (2012) explains why people who continuously believe in misinformation foster environments to believe in conspiracies. As people store misinformation into their memory, they can build their mental processing models around the misinformation, providing a distorted perspective on their reasoning and support for future claims, including conspiracies (Lewandowsky, 2012).

Beyond contextual and informational influences, individual-level factors also play a critical role in shaping susceptibility to misinformation and conspiracy beliefs. Specifically, characteristics such as older age, right-leaning political ideology, lower levels of analytical thinking, and reduced media literacy have been associated with increased susceptibility to weather and climate science conspiracies (Sirlin et al., 2021; van der Linden, 2022). For example, with the catastrophic Hurricane Helene and Milton events in 2024, incorrect evidence surrounding FEMA's "Serious Needs Assistance" aid amounts led the families who were impacted to believe they would *only* receive $750 or $770 of funding from the government (Nilsen, 2024). In reality, this was a simple misinterpretation as the numerical value only related to their short-term immediate assistance program, not the various other long term assistance programs which inherit a majority of the monetary funding FEMA receives from the government (Federal Emergency Management Agency [FEMA], n.d.). This misinterpretation distracted those in need from understanding the availability of other grants and aid programs they were eligible to apply for to receive additional support, placing a target on the back of FEMA for mishandled financial support, when it was not the case. Here, simple fact checking processes and increased

media literacy would have avoided misunderstandings. Shortly after, a conspiracy theory explained the reasoning in low monetary aid resulting from politicians forcing FEMA to route funding from the disaster relief fund towards helping illegal immigrants, an attack on the democratic political party's support of illegal immigrants (Strickler et al., 2024). With the misinformation already placed within the public's mind, the conspiracy quickly gained traction when it made news headlines, forcing the FEMA administration to post statements addressing the misinformation to correct the faulty thinking and mitigate the situation (FEMA, n.d.). Additionally, given this conspiracy attacked democratic political agendas, right-leaning individuals were more likely to believe as it promotes support for their political party. Together, these patterns highlight the critical importance of understanding the cognitive processes enabling individuals to internalize and defend misinformation and conspiracy theories, as such this insight is central to effectively combating their spread.

Negative Influence on Public Safety

In believing these false claims, individuals unknowingly place themselves higher on the vulnerability scale, increasing the overall risk of not only themselves, but others around them, and the response efforts conducted by professionals. The Protective Action Decision Model (PADM) helps to explain why individuals experience confusion and challenges when absorbing information to make safety decisions (Lindell & Perry, 2012). The model outlines that people must be able to understand and personalize risk information before taking any protective measures (Lindell & Perry, 2012). Thus, when faced with confusing, conflicting, or misinformative language, action or preventative measures may be delayed while individuals seek confirmation from other sources to verify the risk. This delay could prove the difference between safety and harm of the individual.

In addition to delayed action, maladaptive behavior may occur based on false beliefs fostered around weather and climate science. Individuals act but take the wrong kind of action due to foundations on misinformation and conspiracy, subsequently increasing their risk of exposure to hazards impacting the area (Lindell & Perry, 2012; Mileti & Sorenson, 1990). The social amplification of risk framework demonstrates how panic quickly forms based on false information propagated throughout media outlets (Kasperson et al., 1988). Once the panic forms, it causes emotionally charged and misguided actions, leading to possible distrust within professionals when they attempt to correct and provide accurate information (Kasperson et al., 1988). The idea of amplification can also be applied towards conflict and community issues on preparedness strategies, next steps, and educated safety actions. Differing beliefs due to misinformation or conspiracy theories can alter trust in warnings, weather professionals, and protective actions, reducing the ability for groups to act safely and be adequately prepared during an event (Drabek, 2018; Tierney, 2019).

More concerning is the desensitization to current and future severe weather and climate event warnings. When individuals are repeatedly exposed to the same misinformation and conspiracies actively speaking out against warning frequency and credibility, it reduces urgency to seek shelter, follow professional instructions, and lead to warning fatigue, otherwise known as the Cry Wolf effect (Dow & Cutter, 1998). The ignorance towards warnings and preventative action may lead individuals to convince others to do the same, drastically increasing one's susceptibility to harm and the total population at risk (Mileti & Sorenson, 1990; Lindell & Perry, 2012). Because of this, emergency personnel and response efforts become strained as a higher number of residents may need rescue due to refusal to evacuate or shelter (Lindell, 2017; Tierny, 2019). Overwhelming response efforts due to incorrect safety procedures can cause the misuse of

resources and increased responder risk as they may be dispatched to more unstable and hardest hit areas (Kapucu, 2008; Tierney, 2019). Thus, the rejection or distortion of weather and climate science deeply rooted within conspiracies and misinformative statements increases individuals' vulnerability to environmental hazards, presenting the important case in reducing these false beliefs to foster a safer, and lower risk, public population.

One of the most dangerous effects of believing in misinformation and conspiracies is how the level of emotions an individual ties to their beliefs can influence them to physically harm or threaten those who do not endorse the same beliefs (Bessarabova & Banas, 2023). More recently, with the catastrophic Kerr County (Camp Mystic) flooding event, individuals were quick to blame impacts of the flooding on cloud seeding projects, where scientists increase rainfall amounts for drought-ridden areas on a small scale (Clark & Doan, 2025). Instead of believing the forecast from the experts explaining the factors causing this event resulted from atmospheric and climatological conditions, topography, and a continuous period of heavy rainfall, people quickly pointed towards weather manipulation. With the presence of prior cloud seeding projects, this fueled weather modification conspiracy theorists to target the CEO of a cloud seeding company, Rainmaker, and blame the intentional causation of this natural disaster event from their cloud seeding projects completed just days before (Hiar, 2026). The CEO was doxxed, received hundreds of death threats, and barraged with calls to be arrested for the ‘crime’ (Hiar, 2026).

Another incident relates to the FEMA recovery response during Hurricane Helene and Milton in 2024. Due to the conspiracy of disaster relief funds being funneled for illegal immigrants, a man in North Carolina actively armed himself with two guns and threatened to hurt FEMA recovery workers operating in his local area, but thankfully authorities arrested him before any actual harm could be done (Vargas, 2024). In Oklahoma, a group, Veterans on Patrol,

believe weather radars and military operations control the weather through manipulation and labels radars as “weather weapons.” In 2025, the group publicly admitted to targeting radar infrastructure in hopes of destroying them, both across the state, but also the country, in an attempt to reduce the governmental control on public populations (Freedman, 2025). Collectively, misinformation and conspiracy beliefs reshape risk perception and emotional responses in ways that not only increase individual vulnerability to hazards but also legitimize harmful and defensive actions against perceived threats from those beliefs, posing significant risks to public safety and emergency response systems.

Vulnerability and Weather/Climate Science Messaging

Influences on Message Perception

Now that we have introduced conspiracy theories, misinformation, and the detrimental effects it can have on public safety, we seek to illustrate the communicative and exposure factors influencing why individuals may support weather and climate science misinformation and conspiracy outside of motivated reasoning. Communication of weather and climate science regularly utilizes probabilistic and scientific language, technical terminology, and levels of uncertainty within forecasting which can be difficult to interpret by non-expert audiences (Morss et al., 2008). Evidence shows that repeated false alarms and inaccurate forecasts can reduce public trust in experts and influence the likelihood that individuals will not comply with future warnings, even when the threat is real (Barnes et al., 2007). Additionally, under pressure or stressful situations, individuals tend to struggle with probabilistic messaging, which can alter trust in forecasts and preparedness actions (Demuth et al., 2016). Uncertainty and misperceptions resulting from confusing terminology may prompt individuals to rely on one of the three

motivational factors to reduce unease, increasing their susceptibility to misinformation and conspiracy beliefs.

Another reason why weather science is frequently misunderstood is due to messages being interpreted through an ideological or identity-based lens. Conspiracy theories often promote distrust of institutions, authority, professionals, leaders, and governments, which in this study's context is weather and climate forecasters, emergency response personnel, and government disaster relief (Douglas et al., 2017). Meta-analyses reveal that climate science acceptance is influenced by ideology and worldview as much as it is by empirical evidence (Hornsey et al., 2016). Because of this, climate science rhetoric is often assessed through identity-based lenses instead of informational ones. These identity-based lenses often embody the form of social or political identities. Those who identify politically with the Republican party are more likely to endorse anti-weather and climate change conspiracies due to the party's stance on climate change and governmental control of the weather (Lewandowsky et al., 2013). With distrust already facilitated in scientific experts through this party, people may receive forecasts, warning messages, or futuristic information with caution or distorted lenses, misunderstanding the true purposes of the initial message and opening the door for misinformative interpretations or conspiracy ideations to be spread (Nyhan & Reifler, 2010). In addition, socio-economic factors may directly influence the way individuals process and respond to information. Lower education can alter the ability for an individual to accurately comprehend weather and climate science misinformation (van der Linden et al., 2020). Rurally located populations are also inherently more susceptible as they foster historical skepticism with government agencies and anti-environmental stances, generating mistrust with the NWS, possibly influencing them to process forecast and weather information with caution (Caretta et al., 2022). With all these

factors working together, the challenges presented with language and rhetoric create an environment where simplified or conspiratorial explanations appear more appealing than scientific communication.

Resources for Weather Information

Alongside navigating language and message style, individuals also must filter through the plethora of sources disseminating weather information across the media. The weather information umbrella encompasses institutional, media, digital, and interpersonal sources across multiple contexts and environments. Many individuals rely on multi-source information processing, seeking repetition in messaging to confirm any serious dangers or warnings for severe weather threats (Ripberger et al., 2014). The National Weather Service remains a central official source, but digital apps have begun to take over as primary accessibility for weather messaging and routine daily forecasts. Prior research indicates that app users place higher value on convenience, perceived accuracy, and specificity, accepting the app results as legitimate despite little transparency on uncertainty in the forecasts provided (Zabini et al., 2016). For lower income families, they may not have access to technologies and resources needed to verify information, relying on less-credible sources to inform them of weather and climate science events, possibly skewing the accurate understanding of a situation (Van Dijk, 2005). Mixed information, multi-source seeking tactics, and lack of access to sources complicates public understanding, thus increasing vulnerability to any possible misleading headlines and narratives before, during, and after severe events.

Spread of Misinformation and Conspiracy in Media

Beyond expert and app sourcing, individuals are known to frequently obtain information and warnings on non-expert channels such as social media, community group pages, and peer or interpersonal networks. Past work demonstrates that during disasters, people are known to use social media platforms for sensemaking, sharing interpretations and observations rather than absorbing official updates (Palen & Anderson, 2016). Although social media can help enhance awareness due to the higher likelihood of exposure to messaging, it inherently increases the likelihood of exposure to misinformation and conspiracy theories. Mainstream media is the form of traditional media where the public gain their news through newspapers, television, and radio (Cambridge University Press, n.d.). Broadcast media has historically functioned as the trusted media source individuals can turn to, as they translate technical forecasts into narratives understood from the non-expert perspective and emphasize impacts and protective actions for the public to understand (Mileti & Sorenson, 1990; Lazo et al., 2009) With multiple forms of media increasing exposure rates, it transforms the process of comprehension and reaction by accelerating the accessibility and information flow for users.

Although the process of consuming information is accelerated, media and social media rapidly facilitate the spread of misinformation and conspiracy (Vosoughi, 2018). Most of these media platforms develop echo-chambers of misinformation and conspiracies, which is an environment where individuals are exposed to content related to their own personal beliefs, resulting in an "echo" of their own ideations (Nguyen, 2020). This plays into the concept of illusory truth, outlined by van der Linden (2022). Here, people can eventually perceive inaccurate or misleading claims as the truth (i.e. weather and climate science misinformation) due to the high frequency of exposure facilitated by their algorithm on a media platform.

Research also consistently reveals false or misleading claims shape public perceptions of truthful information as gaps in knowledge are filled or there is alignment with emotional and political cues (Houston et al., 2015). This causes inconsistent verification behaviors by the audience receiving these messages. Individuals support the idea of cross-checking and verifying sources, but empirical evidence supports the opposite, where verifying a source is more of a social construct, relying on likes, shares, comments, or peer endorsement to decide credibility (Starbird et al., 2014). In a study examining information sharing across Twitter, modernly known as X, misinformation spread is facilitated by the networked communication process in which users rapidly disseminate the false content through retweets and shares.

The reason false information spreads faster than true information is due to false content being perceived as novel and emotionally engaging, increasing the likelihood of individuals sharing for virality (Vosoughi, 2018). Social media and internet platforms like YouTube, TikTok, Instagram, Facebook, and other online sites foster similar environments to X, fueling all different kinds of topics (Newman et al., 2023). For example, online pseudoscience websites and Reddit threads reiterate skepticism on global warming and extreme weather patterns, X most commonly produces searches on climate control and political agendas, YouTube famously curates Flat Earthers, and Facebook is a hub for conspiracy endorsing group environments and tailored advertisements (Clarke, 2024; Holder et al., 2023; Landrum et al., 2021; Nicolosi et al., 2025; Treen et al., 2022). In assessing the relationship between two popular political news broadcast channels, FOX news fosters a negative association with climate change beliefs, heightening denial of climate change and anti-global warming stances, while MSNBC elicits a positive association with climate change acceptance and pro-global warming ideologies (Meirick, 2022). With social media highly consumed amongst the modern public, finding ways

to counteract susceptibility to this information is crucial to fostering safe, educated, and responsible environments.

Strategies to Combat Conspiracy and Misinformation

Inoculation Against False Weather and Climate Science Information

One strategy within academic research applies inoculation as a persuasive tactic to protect individuals against the susceptibility of believing misinformation and conspiracy. Inoculation theory proposes that attitudes and beliefs can be protected against future persuasion by exposing individuals to weakened counterarguments paired with refutable explanations, thus activating motivation to defend beliefs and resist against the incorrect arguing position (McGuire, 1961). This activation is known as motivational threat and is triggered by the forewarning that one's position is vulnerable to future counter attitudinal attacks, prompting the importance of defending their beliefs (Banas et al., 2024; McGuire, 1964). Inoculation studies often involve people who have yet been exposed to, or formed beliefs towards, misinformation or conspiracy theories ideations. The hope is for preventative and preparatory messaging to establish resistance, and the individuals reject the claims presented, successfully protecting them against believing false information. In climate contexts, these inoculation messages expose misinformation strategies like fake experts, documents, or numerical statistics and reveal a reduction in susceptibility to believing misinformative messages and conspiracies (van der Linden et al., 2020; Lewandowsky et al., 2017; Roozenbeek & van der Linden, 2019). To counter the misinformation propagated by the widely circulated Global Warming Petition, which contributed to early public uncertainty regarding the scientific consensus on anthropogenic climate change, van der Linden et al. (2017) demonstrated that both brief and detailed corrective messages effectively inoculated participants against the false claims, significantly reducing belief

in the petition's legitimacy. Cook et al. (2017) found that when inoculating participants using logic-based messages, false-balance misinformation media articles were neutralized and the polarizing effect on beliefs in climate change diminished. We have also seen the testing of active interactions, and passive, to develop skills by providing information through a message, to where it was found that active approaches carry a more influential result in reducing beliefs (Green et al., 2022).

While inoculation widely applies its strategies towards misinformation, recent literature extends these concepts towards conspiratorial beliefs, which present unique challenges due to the narratives and resistance to coercion (Douglas et al., 2017). One of the first studies extending inoculation and metainoculation (i.e. inoculation against inoculation) into conspiratorial beliefs examined the effects on a 9/11 conspiracy documentary, Loose Change: Final Cut (Banas & Miller, 2013). Here, they observed fact-based and logic-based messaging inducing resistance to conspiratorial beliefs, with fact-based being more effective, individuals were more persuaded to believe the conspiracy under metainoculation but more resistant than control, and motivational threat increased underneath both inoculation conditions (Banas & Miller, 2013). To examine cross-cultural effects, Bessarabova et al. (2024) utilized the same documentary with two samples from Finland and the United States, but integrated the strategy of refutational preemption, where they provided an essay refuting the conspiratorial claims with counterevidence and reasoning as the inoculation message. Findings reveal the inoculation treatment increased both motivational threat and resistance to the conspiracy across both cultures, with the US sample showing slightly stronger effects.

During expansive research of inoculation, cross-protection introduced the ideas that inoculation towards the treatment idea may successfully provide protection against related ideas

not treated against within the study. Parker et al. (2012) first discovered this when their findings showed individuals inoculated against peer pressure to have unprotected sex (i.e. treated idea) also became resistant towards peer pressure to binge drink (i.e. untreated but related idea). However, this idea receives mixed findings within conspiracy applications as when inoculating against an anti-vaccine documentary, Vaxxed, both fact-based and logic-based messaging were effective, and equal in strength, at instilling resistance to the film, but findings did not support cross-protection against other conspiracies (i.e. chemtrails, FEMA, illuminati) (Banas et al., 2024). Lastly, few studies directly examine effects of inoculation on weather and climate science specific conspiracies, but one study helps to provide insight by synthesizing effects of inoculation on scientific misinformation, conspiracies, and disinformation beliefs, with some discussion including climate contexts. They discuss that refutational inoculation protects beliefs in climate change scientific consensus and can also place a "blanket of protection" over one's beliefs to protect against future misinformation or proposed conspiracies, indicating a possible cross-protection effect, but no explicit evidence has been found for weather and climate science topics (Compton et al., 2021). Although this study is not grounded in inoculative strategies, the process of interacting with individuals to prevent the likelihood of supporting false beliefs mirrors what this study attempts to do, with our study interacting with individuals fostering pre-existing conspiratorial and misinformative beliefs.

Debunking and Debiasing False Weather and Climate Science Information

Another approach to combatting weather and climate science misinformation and conspiracy is communication strategies focused on debunking, or debiasing, processes (Wright, 2022). Literature on the influence of debunking demonstrates that misinformation can remain in one's memory regardless of correction, unless replaced with an alternative explanation

(Lewandowsky et al., 2012). Forms of effective debunking help to emphasize clarity and coherence with a non-confrontational tone, especially within politicized situations like weather and climate science beliefs. In these contexts, debunking involves correcting false claims, (e.g. weather manipulation) or conspiratorial narratives (e.g. FEMA aid diversion), that arise within media messaging. Studies show extended education on topics related to misinformation and conspiracy reduce skewed perceptions and increase beliefs in the scientific perspective (Hess & Maki, 2019; Mendy et al., 2024; Stevenson et al., 2014). There has also been the application for correcting political authorities' false claims against climate change. Although it increased participants' confidence in accurately understanding the situation after correction of the political claims, it did not affect broader belief levels (Porter et al., 2019). Outside of correcting false claims, studies focus on flawed logic within statements and ideas. One study reveals when skeptics focus on how well pro-climate arguments explain factors leading to the outcomes they oppose, it mitigates the biased evaluation of climate change explanations, climate policy, and proenvironmental behaviors (Johnson, 2017). Providing individuals with different perspectives of evaluating statements, informational background, and corrective measures show promise in mitigating and decreasing the likelihood of continuous conspiratorial or misinformed beliefs.

Debiasing False Information with AI Chatbots

One possible solution to the problem of climate science misinformation and conspiracy theory endorsement is debiasing via artificial intelligence (AI) chatbots. AI technology assists the public with navigation and comprehension of media content, fact checking, and explaining the falsehoods that exist within media. These systems can be formatted as conversational agents, search-integrated chatbots, or platform-embedded assistants accessible through specific browsers, applications, and media platforms. In recent years, we have seen public consumption

of these conversational chatbots rapidly influence AI technology's dominance on a global scale (Kennedy et al., 2023; Simon et al., 2025). Research diving into human-AI interaction suggests that people rely on AI systems when they help to reduce cognitive effort loads, provide rapid responses, and present their resulting responses in confident language (Glikson & Woolley, 2020). From a cognitive perspective, the fluency of the chatbot and personalization abilities increases credibility of its opinions, even when users may lack expertise to evaluate the accuracy of its responses (Fogg et al., 2003; Sundar, 2008). The opportunity for this kind of usage easily exists in weather and climate science conspiracy contexts due to the high uncertainty and difficulty in comprehending messaging or forecasts. Thus, it could cause an individual to access a chatbot for assistance in sense-making of the situation, navigating the forecasts and warnings, or seeking advice to accurately interpret misinformation or conspiracy theories. For the public, this relationship frames AI as a "first stop shop" to answer questions, solve problems, and evaluate information.

Despite the growing scholarship on AI technologies, limited research examines how AI chatbot assistants influence the formation, reinforcement, or reduction of conspiratorial beliefs, highlighting a critical gap warranting further investigation. Even though AI's highly persuasive visual capabilities can amplify the spread of false claims and conspiracy theories through realistic images and audio editorial abilities, it simultaneously demonstrates strong potential as a reliable and credible fact-checking tool (Shin, 2024). There is a small, but emergent, literature investigating AI assistants and their influence on conspiratorial beliefs (Boissin et al., 2025; Costello et al. 2024; Meyer et al., 2024; Wang & Tanes-Ehle, 2023). A multitude of other studies exist on the impact of AI conversations reducing beliefs, but the scholarship focuses on health, political, and science misinformation rather than weather and climate science conspiracy and

misinformation. In the following paragraphs, studies on AI chatbot debiasing of conspiracy theory beliefs are discussed.

One study examined two conspiratorial topics on the manipulation of data on human-induced climate change and the cause of COVID-19 (Wang & Tanes-Ehle, 2023). Here, participants were exposed to one of three conditions: engage in a conversation with an AI assistant chatbot that was less empathic and factual, engage in a conversation with a more empathetic and affective chatbot, or read an article covering either of the two topics. Once completed, they evaluated overall conspiratorial belief influence, user experience, ambiguity aversion (low, medium, and high), source likability, and source credibility amongst 189 participants. Ambiguity aversion refers to the level of aversion one fosters towards comfortability of uncertainty and familiarity (older vs. newer conspiracies) surrounding the conspiracy topic. For COVID-19 discussions, the article condition was most effective in reducing beliefs, differences in empathetic chatbots did not significantly reduce beliefs, and there was no ambiguity aversion effect found. In their study, and relevant to this experiment, climate change discussions yielded slightly different results, revealing a possibility of contextual differences leading to altered effects and strategy implementation. Specifically, the more empathetic chatbot was most effective in reducing climate change conspiracy beliefs among individuals with low to medium ambiguity aversion levels (i.e. those more comfortable dealing with uncertain information and evolving facts). In contrast, individuals with high ambiguity aversion (i.e. individuals preferring clear, definitive information), the less empathetic chatbot and article conditions were more effective in reducing beliefs. For both topics, source perceptions were not affected on the measures of credibility or likability, and users enjoyed the chatbot experiences more than reading an article (Wang & Tanes-Ehle, 2023). These findings suggest the

effectiveness of AI interventions may depend on the length of existence for a conspiracy theory and the tolerance an individual has towards information uncertainty.

A second study utilized a street epistemologist, or AI chatbot, "Chip" to talk with just under 2,000 participants about a selected conspiracy statement (Meyer et al., 2024). Participants were provided with a list spanning seven different topics ranging from JFK's assassination to climate change is a hoax, and prior to engaging with the chatbot, they rated their level of agreement to each statement on a scale from 0-10. The conspiracy statement discussed with the chatbot had to be strongly endorsed (rated 6-10 on the scale), and then each participant was instructed to interact with Chip in one of three ways. Once the topic was selected, they either discussed reservations towards supporting their conspiracy statement, explained reasons why they endorse their chosen conspiracy statement, or talked about their reservations towards supporting three non-conspiratorial statements about food. Each of the three conditions observed a significant decrease in beliefs from pre- to post-conversation, with a slightly larger effect found on both conditions discussing reservations for full support of the statement. Another relationship examined belief change based on participants' overall conspiratorial thinking measured by the American Conspiracy Thinking Scale (ACTS). The ACTS assesses the extent to which individuals endorse conspiratorial explanations and interprets events through a conspiratorial lens. Those with low thinking levels saw a significant reduction in belief levels, moderate thinking levels revealed significant reductions but not as large as lower levels, and individuals with high conspiratorial thinking levels showed no significant decrease. This sheds light on the need for different strategies to reduce beliefs for those higher in overall conspiratorial thinking. The study expands on AI chatbot influence by examining different approaches to conducting conversations, where asking the individual to speak on their hesitancy towards supporting a

statement revealed a significant belief reduction effect, especially on those with lower and moderate conspiratorial thinking levels.

Costello et al. (2024) expanded this literature by conducting a study in which the AI model is trained to tailor its responses to directly refute the participants' claims. Instead of seven statements, this study encompassed fifteen popular conspiracy theories selected from the Belief in Conspiracy Theories Inventory (BCTI). This study again encompassed a wide variety of topics for the theories. Before beginning the conversation, 2,190 participants selected the topic of conversation based on the condition and provided initial belief levels. Then, each person engaged in a basic three-round, or three turn each, conversation with the refutational AI model and discussed why they support the chosen statement. Upon completion, individuals re-state their belief levels to compare with their pre-conversation indication. This study design, with exception of the conspiracy topics participants discuss, is replicated for the purposes of our experiment. Belief levels were collected 10 days and two months later to study longevity of effectiveness. Results immediately after the conversation reveal promising trends, with average belief levels reduced by 20%, much larger than the control condition. Importantly, belief reduction was maintained for both 10 days and two months out and aided in reduced belief for other unrelated conspiracies, contrasting from previous literature noting debunking or inoculating effects fading over time, often within weeks of initial exposure (Banas & Rains, 2010; McGuire, 1964). Surprisingly, they stated that the reported main effect was consistent across all belief levels, as even those with initial beliefs higher than 90% ($N = 57$), experienced significantly reduced levels after engaging with the AI model, a group with non-significant effects up until this point.

An extension study conducted more recently examined the influence of messenger labels in the process of reducing conspiracy beliefs, even though both conditions came from an AI

chatbot model (Boissin et al., 2025). Using a three-factor experimental design, the authors manipulated debunker identity (AI vs. "human expert"), conversational style (neutral vs. human-like tone), and belief type (conspiratorial vs. non-conspiratorial). Participants were measured on their pre- and post-conversation belief levels towards a statement, but this time, they provided the AI chatbot with one of their own statements, revealing a non-conspiratorial belief or a conspiracy they personally believed. The AI, regardless of label, was coded to refute the participants' beliefs and to conduct two-turn conversations with participants. Overall, conversations with the chatbot significantly reduced conspiracy theory beliefs across all four conditions. Furthermore, the conversations where participants spoke on conspiracies revealed beliefs reduced almost twice as much (11.8% drop) compared to those with non-conspiratorial topics (6% drop). Across conditions, label of the messengers ("human" vs. AI) and tone (neutral vs. "human-like") of the chatbot assistant did not provide any differing effects on belief reduction. This study indicates the effectiveness of debiasing or debunking might be through content and approach, such as refutation through evidence, in messaging sent out to individuals to successfully reduce conspiratorial beliefs.

The current literature supports the idea that AI models, or chatbot assistants, may be useful for debiasing and debunking conspiracy theory beliefs. We are left with a gap in understanding on the relationship of these reduction effects across specific conspiracy topic groups. It is important to understand the durability of these effects across different topics, as Wang & Tanes-Ehle (2023) demonstrated that different contexts, such as weather and climate science conspiracies, may require altered strategies or approaches in programming the AI chatbot to achieve significant reduction results. With the promising findings, the studies above reveal the possible success of AI-mediated communication reducing beliefs across a wide variety of

conspiracy topics. Thus, an in-depth analysis examining the specific topic group of multiple weather and climate science conspiracies is needed. Therefore, our study tests the following hypotheses:

H1. Participants in the experimental condition will exhibit greater reductions in conspiratorial beliefs from pre- to post-conversation compared to those in the control condition.

H2. There is an interaction between time of measurement and chatbot conversation on motivation to defend belief, such that at pre-conversation there is no difference between engaging in a refutational chatbot conversation about weather/climate conspiracy and a non-conspiracy topic; however, at post-conversation, motivation to defend belief is higher following the refutational chatbot conversation compared to the neutral chatbot conversation.

Chapter Three: Method

Participants

A total of 220 participants were included in the final sample and randomly assigned to one of the two conditions: experimental (n = 100) and control (n = 120). Participants ranged in age from 18 to 72 years (M = 36.84). The sample was composed of both female (54.1%) and male (45.9%) participants. In terms of the racial distribution amongst participants, the majority identified as White (75%), followed by Black or African American (10.5%), individuals identifying as two or more races (6.8%), other racial identities (6%), Asian (3.6%), and Native American or Alaskan Native (1.4%). Regarding highest educational achievements, participants reported obtaining a high school diploma (45.5%), followed by a bachelor's degree (31.4%), other forms of education (10.5%), master's degree (10.2%), GED (2.3%), and doctoral degree (1.5%). Politically, the sample was predominantly Republican (60.5%), with Independent (17.7%), no affiliation (12.3%), Democrat (8.2%), and other affiliations (1.4%) following.

On average, participants took 28.9 minutes to complete the study (SD = 95.28 minutes). Upon investigating the rather large standard deviation, it was found that three student responses took over three hours to complete, possibly due to breaks or leaving the tab open before returning to complete the survey. When we removed those three outlier cases, the average time to complete the study adjusted to around 19.48 minutes (SD = 17.88 minutes). The variation in time could be attributed to the effort put into the AI conversation or natural speed of reading questions within the survey as some questions were longer than others. Out of the fifteen conspiratorial topic options, each were chosen as a topic of conversation at least once. The most popular topics were chemtrails (21%), flat earth (17%), and climate change is a hoax (12%), with

lesser topics discussing directed energy weapons (DEWs) (3%), drought manipulation (3%), and Texas flooding caused by cloud seeding (1%).

Participants were recruited in one of three ways. First, students enrolled in undergraduate communication courses at a large public university in the South-Central part of the US were invited to participate through the departmental research participation pool (n = 43). Second, using a snowball sampling, students were asked to recruit their family members to participate in the study (n = 31). Each student was allowed to recruit up to five family members, and, in exchange for family members' participation, students received research credit toward their course grade. Our student participants and family members were pre-screened for eligibility by answering fifteen conspiracy statements where they selected "I don't believe any of these statements are true" or "I believe at least one of these statements could be true or is true." Those who did not believe in any of the statements were skipped to the end of the survey and filtered out from the data set. Third, we recruited participants from the online research platform Prolific (n = 146). Due to the broad scope of individuals included within the Prolific platform, we placed a screening question to narrow down our targeted audience. We selected participants who answered "no" or "don't know" to the question of "Do you believe in climate change?" All participants were required to be above the age of 18, speak English as their first language, and pass our screening question for eligibility.

Design and Procedure

AI Chatbots

Based on the AI chatbot conspiracy literature, ChatGPT and other language models have been used for these types of conversations (Costello et al., 2024; Meyer et al., 2024). This study

incorporated the most updated version of ChatGPT, which at the time of data collection, was GPT-5. Individual chatbots were created to represent the control and experimental condition. Each chatbot was embedded with specific instructions outlining the role it played, the conversation rules, message structure and restrictions, specifications for how it is to respond to participants, and how to capture transcripts for future analysis (see Appendix 1A). One thing that differed between the control and experimental conditions were the fifteen topic statements to discuss with the specific chatbot condition. The control condition included fifteen non-conspiratorial statements, that were unrelated to weather and climate science, on which the participant could debate the chatbot (see Appendix 1B). The experimental condition included the fifteen topics of conspiratorial statements related to weather and climate science (see Appendix 1C). These were the same topics used in the pre-screen question to determine eligibility for the study and the ones used to determine pre-conversation conspiratorial belief levels. Both chatbots were accessible through a link embedded within our Qualtrics survey.

A reminder for participants to return to the survey after completing the conversation was coded into the chatbot's closing message that appeared before the end of discussion. To organize the collected transcripts, our chatbot asked to collect the anonymous platform ID number associated with their participant profile or the last four digits of a phone number for our snowball sample of family members. This information was asked in the introductory message generated from both chatbot conditions before engaging in the conversation. Participants then completed a six-turn conversation, where the chatbot and individual spoke three times each.

Survey Design

There were two surveys used in this experiment, one for our Prolific and SONA participants, and the other for family members. Each survey was identical except for the family

survey including a question to provide the student's name for extra credit purposes. All participants completed a consent statement and asked to indicate their age. To continue with the study, participants then answered the screening question. Once completed, they were prompted to continue answering questions or thanked for their time if they did not pass the screening. Unless unforeseen technical issues arose, each participant was only allowed to take the survey once. After completion of the pre-conspiratorial belief and pre-motivation to defend belief measures, participants were then directed to the interaction with our chatbot. Before clicking on the link provided, a short paragraph previewed what to expect for the conversation, how to trigger the chatbot correctly, and a reminder to return to the survey after completing the conversation.

Participants were randomly assigned to experimental conditions. Once participants clicked the link, they were directed to a new, separate window from the survey to complete the conversation. Participants were tracked to measure if they clicked the link to interact with the chatbot. If participants completed the survey, but did not click on the link provided, their results were not included into the analyses. After returning from the conversation, participants then fill out their post-conspiratorial belief and post-motivation to defend their belief values while following the instructions for each condition. In the experimental chatbot condition (i.e., wherein they engaged in a refutational chat about weather/climate conspiracy), they were instructed to respond to the question on the topic they discussed with the chatbot, not other statements, for proper comparison of pre- to post-belief levels. Within the control condition, participants completed all fifteen items again to see if their beliefs changed regardless of conversation topic.

After completion of the post-conversation attitude measures, participants responded to an attention check consisting of a question asking them to select the answer "cloud." If they did not

pass, they were routed to the end of the survey, and their responses were removed from the dataset. If passed, they continued to complete the post-conversation levels for motivation to defend beliefs. Finally, participants completed the demographic questions and were thanked for their time before being directed off the survey.

Measures

Conspiratorial Attitudes

Based on Costello et al. (2024), conspiratorial attitudes were measured on a 1 to 11-point scale, (1 = *no belief*, 11 = *full belief*). Prior to engaging with the chatbot, participants read fifteen conspiracy statements provided within the survey (e.g. "*Long-lasting condensation trails left in the sky by high-flying aircraft are "chemtrails" consisting of chemical or biological agents, sprayed for multiple purposes such as weather modification, population control, chemical warfare, or biological testing."* and *"Climate change is an idea orchestrated by an elite group in order to control markets through their economic and climate change mitigation policies."*). In contrast to Costello et al.'s (2024) study, the fifteen statements were strictly related to weather and climate science topics (see Appendix 1C). Conspiratorial attitudes were measured twice before and after the chatbot conversation. In the experimental condition, participants were instructed to indicate beliefs only toward their selected topic of discussion while control participants responded to all fifteen conspiracy items again.

Motivation to Defend Beliefs

Participants were asked to indicate the extent to which they were motivated to defend their attitudes. One item ("I feel motivated to defend my beliefs.") from Banas and Richards' (2010) measure of motivation threat was used. Just like with conspiratorial attitudes, pre- and

post-conversation motivation levels were collected. This measure was assessed on a 7-point Likert-type scale (1 = *strongly disagree*, 7 = *strongly agree*).

Analytic Strategy

The data was analyzed using the IBM SPSS v. 31. Prior to hypotheses testing, variables were screened for violations of normality assumptions by examining each item's skewness and kurtosis. A composite measure of conspiratorial beliefs was created by averaging responses across the fifteen items assessing weather and climate science-related conspiracy theories for both the pre- and post-AI conversation. In the experimental condition, values provided in response to their discussed conspiracy were used for the pre- and post-AI conversation values. To examine changes in conspiratorial beliefs and motivations to defend beliefs, a repeated measures analyses of covariance (ANCOVA) was conducted, with time (pre-conversation vs. post-conversation) of measurement as the within-subjects factor and AI-conversation (refutational chat about weather/climate conspiracy vs. a refutational chat on a neutral topic) as the between-subjects factor. The ANCOVA results were used to test H1. In the ANCOVA, motivation to defend beliefs was included as a covariate in analyses testing H1. Motivation to defend beliefs was also examined separately as a dependent variable in a repeated-measures ANOVA, testing H2.

Chapter Four: Results

Conspiratorial Belief

H1 predicted that participants assigned to the experimental condition (i.e., had a refutational chatbot conversation about a weather/climate conspiracy) would exhibit greater reductions in conspiratorial belief levels over time compared to the control (i.e., had a refutational chatbot conversation on a non-conspiracy, neutral topic). A repeated measures ANCOVA was conducted to examine the changes in conspiratorial belief levels from pre- to post-AI conversation between the experimental and control chatbot after controlling for motivation to defend beliefs. The results revealed a significant main effect of time, $F(1, 217) = 19.62$, $p < .001$, $\eta_p^2 = .083$, indicating conspiratorial beliefs decreased overall following completion of the AI chatbot conversation for both conditions (pre-conversation: $M = 5.63$, $SD = 3.15$ vs. post-conversation: $M = 5.04$, $SD = 3.32$). Results additionally revealed a significant main effect of chatbot conversation, $F(1, 217) = 25.76$, $p < .001$, $\eta_p^2 = .106$, indicating that conspiratorial beliefs increased after chatbot conversation about a weather/climate conspiracy ($M = 6.38$, $SD = 3.72$) relative to the chat on a neutral topic ($M = 4.47$, $SD = 2.43$). The aggregated values in the control condition were averaged across all conspiracy topics, providing a lower overall value than the single, specific conspiracy discussed in the experimental condition. Conspiracy belief ratings in the experimental group were higher because participants selected a conspiracy they strongly believed in to discuss with the chatbot. These mean differences are therefore likely an artifact of how conspiracy beliefs were measured in the experimental versus control conditions. These main effects were qualified by a significant interaction between time and chatbot conversation, $F(1, 217) = 18.31$, $p < .001$, $\eta_p^2 = .078$, suggesting the magnitude of change in conspiratorial beliefs from pre- to post-conversation differed across conditions.

To further investigate these changes in conspiratorial beliefs within each condition, paired-samples *t* tests were conducted to ascertain differences across time measurement and conditions. Participants in the control condition exhibited a non-significant decrease in conspiratorial beliefs from pre-conversation ($M = 4.51$, $SD = 2.28$) to post-conversation ($M = 4.43$, $SD = 2.57$), $t(119) = 1.22$, $p = .227$, $d = 0.11$. In contrast, participants in the experimental condition, who engaged in the refutational chat about a weather/climate conspiracy, demonstrated a significant decrease from pre-conversation ($M = 6.98$, $SD = 3.51$) to post-conversation ($M = 5.78$, $SD = 3.93$), $t(99) = 4.52$, $p < .001$, $d = 0.45$ (see Figure 1 below). These findings support H1, demonstrating that engagement with the AI chatbot that directly refuted the participants' position on conspiratorial beliefs about weather/climate, was associated with a significant decrease in conspiratorial beliefs on the weather and climate-science-related topics.

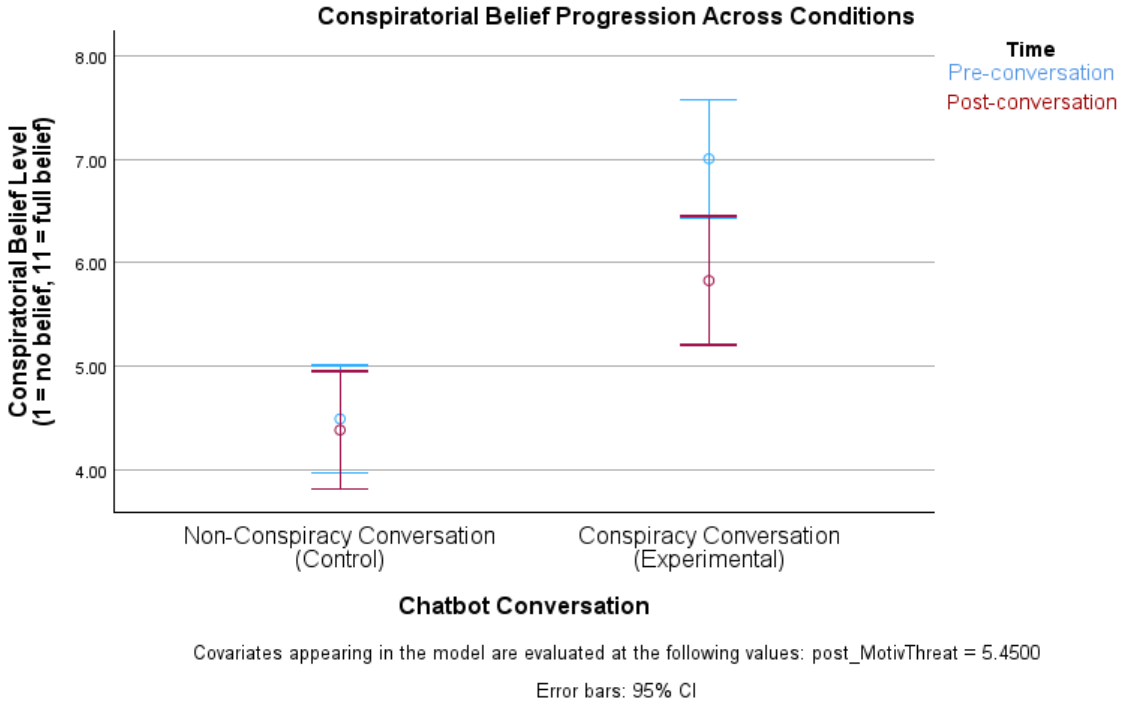

Figure 1. This plot represents the estimated marginal means for belief levels over time (pre-conversation to post-conversation) by the assigned AI chatbot conversation (experimental vs. control statements). Participants in the experimental condition (chatbot conversation about weather/climate conspiracy) exhibited a greater reduction in conspiracy beliefs over time as compared to the control (debatable non-conspiratorial belief). Error bars represent the 95% confidence intervals.

Motivation to Defend Beliefs

H2 predicted that participants interacting with a refutational chatbot about a weather/climate conspiracy will show a greater increase in motivational levels to defend their conspiratorial beliefs compared to those in the control condition who had a chat on a non-conspiratorial, neutral topic. A repeated measures ANOVA was conducted to examine the differences in pre-to post-conversation motivation levels to defend one's beliefs as a function of condition. Results indicated a significant main effect of time on motivation to defend beliefs, $F(1, 218) = 4.05$, $p = .046$, $\eta_p^2 = .018$, indicating an increase in motivations to defend belief overall following completion of the AI chatbot conversation for both conditions (pre-conversation: $M = 5.28$, $SD = 1.40$ vs. post-conversation: $M = 5.45$, $SD = 1.41$). However, there was no significant main effect of chatbot conversation, $F(1, 218) = 0.59$, $p = .443$, $\eta_p^2 = .003$. These results were qualified by a significant interaction between time and chatbot conversation, $F(1, 218) = 5.14$, $p = .024$, $\eta_p^2 = .023$. To further investigate the differences across conditions and time of measurement, paired-samples *t* tests were conducted. Participants in the control condition demonstrated a significant increase in motivations to defend their beliefs from pre- ($M = 5.18$, $SD = 1.42$) to post-conversation ($M = 5.52$, $SD = 1.31$), $t(119) = -4.138$, $p < .001$, $d = 0.38$. Contrary to the control, participants in the experimental condition exhibited a non-significant decrease in motivation to defend their beliefs from pre- ($M = 5.39$, $SD = 1.37$) to post-conversation ($M = 5.37$, $SD = 1.52$), $t(99) = 0.14$, $p = .887$, $d = 0.01$, see Figure 2 below. Although participants in the control condition experienced an increase in motivations to defend

their beliefs, those in the experimental condition did not change significantly from pre- to post-conversation. Therefore, H2 is not supported.

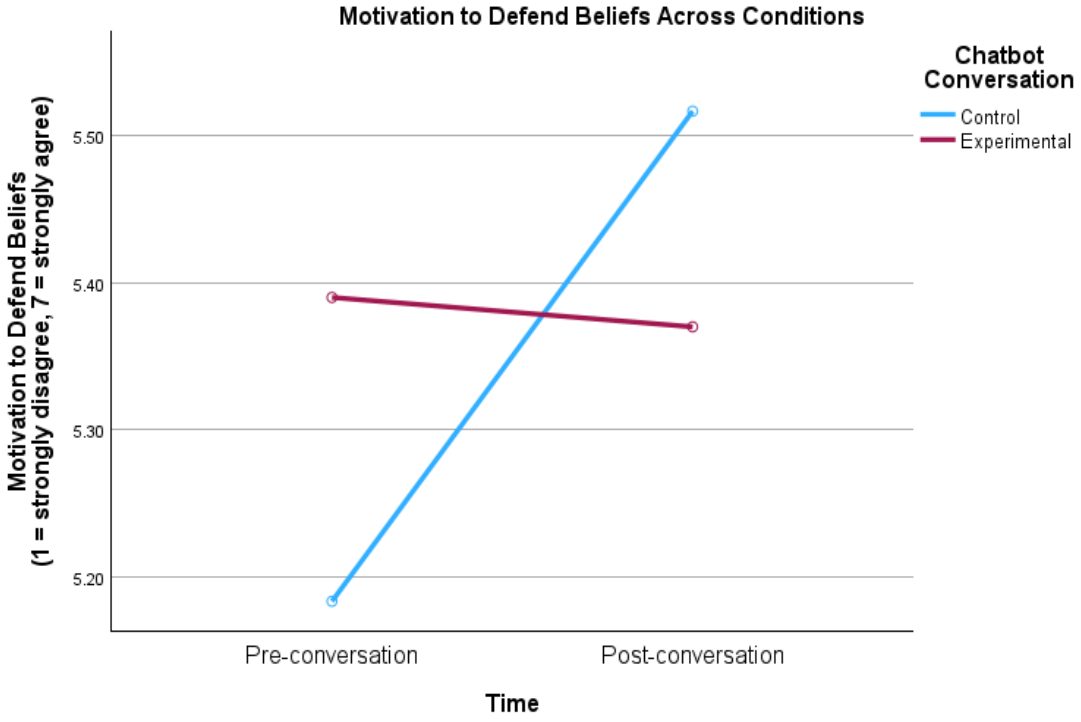

Figure 2. This plot represents the estimated marginal means of motivation levels to defend beliefs across time (pre-conversation to post-conversation) by chatbot conversation (conversation about weather/climate conspiracy vs. non-conspiratorial, neutral topic). Participating in the refutational chatbot conversation about weather/climate conspiracy did not affect participants' motivations to defend beliefs, while those in the control significantly increased their motivation to defend beliefs. Error bars represent 95% confidence intervals.

Chapter Five: Discussion

The goal of this study was to examine the effects of a brief AI chatbot conversation on beliefs related to weather and climate science conspiracy misinformation. In doing so, this study aimed to extend the scope of prior research on AI chatbot driven belief change by focusing specifically on weather and climate topics as prior research findings suggest weather and climate science topics may need different approaches to successfully reduce beliefs (Wang & Tanes-Ehle, 2023). We evaluated the effects of the chatbot, which refuted either a conspiratorial or non-conspiratorial topic, on changes in beliefs from pre- to post-conversation. In addition, this study assessed changes in participants' motivation to defend their beliefs, conceptualized as a component of motivated reasoning. The findings support previous research demonstrating AI chatbot interactions can reduce conspiratorial beliefs. Results also indicate an increase in participants' motivation to defend their beliefs within the control condition, but not in the experimental condition. This pattern, while not entirely in the hypothesized direction, is important as motivation to defend beliefs represents a component of motivated reasoning, a cognitive process not widely measured within AI chatbot research literature in addressing populations with pre-existing conspiratorial beliefs.

The present study contributes to a growing body of research examining how individuals maintain beliefs in misinformation and conspiracy theories, particularly in the context of emerging AI technology. This topic is important as the public has increasingly turned to this technology to assist in the navigation of information exposure across media platforms. People who hold conspiracy beliefs are resistant to change, with some literature suggesting that individuals who hold strong conspiratorial views may be largely unreachable or most difficult to debias (Banas & Bessarabova, 2023; Lewandowsky & Cook, 2020). Rather than reinforcing the

notion that individuals are resistant to belief change, the present results align with research demonstrating that interventions, particularly through AI chatbots, may introduce some degree of uncertainty to previously held beliefs (Boissin et al., 2025; Costello et al., 2024; Meyer et al., 2024; Wang & Tanes-Ehle, 2023). These findings are particularly meaningful when considered alongside the work of Wang and Tanes-Ehle (2023), who identified differential effects in AI-based interventions depending on topic (e.g. climate change or COVID-19 conspiracies) and communication style (e.g. article, empathetic chatbot, factual chatbot). Our findings extend this literature by situating a refutational and factual chatbot within a plethora of weather and climate science related conspiracies and successfully reducing conspiratorial beliefs.

Importantly, this study also contributes to the understanding of one's motivation to defend conspiracy theory beliefs. Motivated reasoning is posited as the central obstacle to debunking efforts because individuals selectively process information in ways that reinforce their pre-existing stances and increase their resistance to counterevidence (Kunda, 1990). The findings of this study suggest this perspective may be deterministic and warrants further research within the AI chatbot debiasing context. The control condition followed our hypothesized direction, revealing a significant increase in motivations to defend beliefs, but proved more effective in increasing motivations when compared to the experimental condition discussing their actual conspiratorial belief. What is surprising is that the experimental condition experienced a slight, almost negligent, decrease in motivations to defend beliefs. The increase in the control condition discussing non-conspiratorial beliefs could be attributed to participants feeling motivated to defend their conspiratorial beliefs from the refutation towards another important, but non-conspiratorial, belief of theirs. Motivated reasoning research suggests that even when less central attitudes are challenged (i.e. non-conspiratorial statements), such threats can activate defensive

processes that extend to more strongly held beliefs (i.e. conspiratorial beliefs) (Kunda, 1990; Lewandowsky et al., 2012). However, the greater increase in motivations in the control condition could also be attributed to misinterpretations of the specific belief the motivation measure participants answered for. Instead of answering in relation to their conspiratorial beliefs, they may have answered based on their non-conspiratorial belief they just discussed within the AI-conversation. Thus, this relationship could also be explained due to the misinterpretation of the question itself. Nonetheless, the relationships revealed in the results suggest that engagement with AI-mediated conversation may not heighten defensiveness in the way traditional motivated reasoning frameworks might predict. Such interactions may create conditions in which individuals are more willing to engage with counterevidence that opposes their beliefs but also activate their motivations to defend beliefs across other identity-central stances not directly threatened.

Our study, along with previous studies in the AI literature, also point to a potential weakness of the technology, which is how easily it can be manipulated to meet one's needs (Klinkhammer, 2024). As researchers, we could easily manipulate AI to approach a conversation in a specific way and talk to individuals in a certain manner, but we made sure the AI chatbot communicated factually correct information (Boissin et al., 2025; Costello et al., 2024; Meyer et al., 2024; Wang & Tanes-Ehle, 2023). Individuals or social media CEOs can easily manipulate AI to satisfy specific needs (e.g. flattery), highlighting the downside of interacting with biased chatbots which can shape opinions, actions, and information generated to reflect the views of whoever created the chatbot. Now, there have been policies set in place to protect against the spread of misinformation and conspiracy theories, but AI technology has shown to deviate from initial instructions as it evolves and absorbs the information inputted from users (Mitchell, 2019).

Although we recommend AI technology to be integrated within media literacy trainings, it should include an educational aspect to warn individuals of the biases and program distortions that may be experienced by specific chatbots associated with certain media platforms, thus briefing individuals on which chatbots are the safest option in getting accurate information.

With the increase in adoption of AI technology practices, these results uncover promising effects on public safety and media literacy. In contexts of weather and hazards, inaccurate or biased messages may be debiased by AI, which can promote protective behavior, increase epistemic trust in experts and compliance with warnings and related messaging, and provide increased education on a specific topic, or phenomenon, for a more informed individual background. Successful communication through an AI-mediated conversation can enable accurate comprehension and reduce beliefs towards conspiratorial statements, leading individuals to become more educated on topics, adopt media literacy strategies, and assess situations with a different perspective, lowering the odds of future susceptibility.

Limitations and Future Research

This study does not come without limitations. The sample composition may influence the generalizability of the findings, particularly in political orientation and race contexts, as our sample was predominantly Republican and white. The skewness of political orientation may be a result of weather and climate science topics being heavily politicized within the media, meaning those who support anti-climate change stances, such as the Republican party, are more likely to be those who believe in weather and climate science related conspiracies. Additionally, the short-term nature of the AI interaction and measurement of belief change limits conclusions about the durability of these effects across time. Prior work, such as Costello et al. (2024) has demonstrated that belief change can persist over longer periods, for both two weeks and two

months out. Therefore, we suggest that future research should examine if AI-mediated interventions can produce sustained reductions in both belief endorsement and motivation levels to defend beliefs for weather and climate conspiracies. It is also important to consider our findings relating to our second hypothesis with caution. The lack of significant differences between conditions indicates that observed effects are subtle and require more research enacting stronger manipulations, larger sample sizes, or repeated exposure to produce more robust findings. We believe this to be a result of measuring motivation to defend beliefs through one item. While informative, this measure may benefit from refinement or additional items to capture other dimensions of motivated reasoning, such as emotional arousal, perceived identity threat, or cognitive resistant strategies.

An opportunity to extend this research includes exploration of the possible inoculative potential for AI chatbots as they weaken the strength of conspiratorial beliefs, and in our study, produce trends slightly reducing defensive processing of those false beliefs over time. Research shows that we can successfully debias people against conspiracy beliefs through AI, and since inoculation has shown promise in resistance against conspiratorial beliefs, future research may attempt to integrate AI generated messages or interactions as possible inoculation strategies before exposing individuals to misinformation and persuasive messaging. Inoculation theory also poses the component of motivational threat, where warnings are provided to individuals that their beliefs may be vulnerable, thus triggering motivations to defend their stance. It would be interesting to see the relationship of motivational threat within AI chatbot interactions as it measures multiple dimensions of cognitive defensive processing, unlike our study that primarily focused on motivated reasoning and motivations to defend beliefs with one measure.

Additionally, cross-protection effects are important to investigate within this topic group. A continuing question in the literature examines whether inoculating individuals against one conspiracy can indirectly increase resistance against others. Although research provides mixed results, further application within the context of weather and climate science is needed as the relationships between these ideas remain underexplored. The consequences associated with misinformation and conspiracy beliefs in weather and climate science heighten the need to advance this area of research both theoretically and practically. As beliefs shape protective action decisions, affect emergency response systems, and erode trust in expert guidance, identifying effective intervention strategies remains a critical priority. AI-mediated communication presents a promising, yet complex, tool in the effort to debias and resist false beliefs, underscoring the need for continued research to refine its application and maximize its potential to support public safety and informed-decision making. Lastly, the team will expand work on the current study by analyzing the transcripts collected from each participant conversation with our AI chatbots. We plan to conduct a form of qualitative analysis to gain insight into the communicative strategies implemented by the refutational chatbot to reduce belief levels in participants and how it may have shaped the participants' reactions to the messages generated. These results may help to inform us on how communication with AI successfully reduced beliefs in the interaction and could help provide valuable information to programmers and continue the fight against misinformation and conspiracy theories.

Chapter Six: Conclusion

The present study contributes to a growing effort to understand and mitigate the influence of misinformation and conspiracy theories within a complex modern information environment. As false narratives targeting weather and climate science continue to spread, the need for effective, versatile interventions becomes increasingly urgent. The findings of this study demonstrate that brief interactions with a refutational AI chatbot can reduce conspiratorial belief endorsement among individuals with pre-existing beliefs. Changes in motivation to defend one's beliefs were more nuanced and did not reach statistical significance, but the observed trends suggest conversation with AI may disrupt, rather than reinforce, defensive reasoning processes. Importantly, we highlight the potential for AI technologies to serve as accessible tools in broader conspiracy misinformation mitigation strategies. When designed thoughtfully, conversation AI may be integrated into media literacy initiatives, public communication efforts, and risk messaging frameworks to encourage critical evaluation of information, reducing the influence of these harmful narratives. Such approaches are necessary to battling against the growing epidemic of weather-related misinformation and conspiracy theory endorsement as it continues to shape public understanding and decision making. Given the real-world consequences of believing in misinformation and conspiracies, these findings emphasize the importance of developing and refining interventions addressing both belief formation and underlying motivations sustaining those beliefs. As misinformation and conspiracy continues to evolve, so too must the strategies used to combat it, positioning AI as a possible adaptable component in the ongoing effort to foster informed and resilient populations.

Reference List

Banas, J. A., Bessarabova, E., Penkauskas, M. C., & Talbert, N. (2024). Inoculating against anti-vaccination conspiracies. *Health Communication*, *39*(9), 1760-1768. https://doi.org/10.1080/10410236.2023.2235733

Banas, J. A., & Rains, S. A. (2010). A meta-analysis of research on inoculation theory. *Communication Monographs*, *77*(3), 281-311. https://doi.org/10.1080/03637751003758193

Banas, J. A., & Miller, G. (2013). Inducing resistance to conspiracy theory propaganda: Testing inoculation and metainoculation strategies. *Human Communication Research*, *39*(2), 184-207. https://doi.org/10.1111/hcre.12000

Banks, J., & de Graaf, M. M. (2020). Toward an agent-agnostic transmission model: Synthesizing anthropocentric and technocentric paradigms in communication. *Human-Machine Communication*, *1*, 19-36. https://doi.org/10.30658/hmc.1.2

Barnes, L. R., Gruntfest, E. C., Hayden, M. H., Schultz, D. M., & Benight, C. (2007). False alarms and close calls: A conceptual model of warning accuracy. *Weather and Forecasting*, *22*(5), 1140-1147. https://doi.org/10.1175/WAF1031.1

Bessarabova, E., & Banas, J. A. (2023). Emotions and the QAnon conspiracy theory. In J. E. Uscinski (Ed.), *The social science of QAnon: Understanding a new social and political phenomenon* (pp. 87–103). Cambridge University Press.

Bessarabova, E., Banas, J. A., Reinikainen, H., Talbert, N., Luoma-Aho, V., & Tsetsura, K. (2024). Assessing inoculation's effectiveness in motivating resistance to conspiracy propaganda in Finnish and United States samples. *Frontiers in Psychology*, *15*, 1416722. https://doi.org/10.3389/fpsyg.2024.1416722

Biddlestone, M., Azevedo, F., & van der Linden, S. (2022). Climate of conspiracy: A meta-analysis of the consequences of belief in conspiracy theories about climate change. *Current Opinion in Psychology, 46*, 101390. https://doi.org/10.1016/j.copsyc.2022.101390

Boissin, E., Costello, T. H., Spinoza-Martín, D., Rand, D. G., & Pennycook, G. (2025). Dialogues with large language models reduce conspiracy beliefs even when the AI is perceived as human. *PNAS Nexus*, *4*(11), pgaf325. https://doi.org/10.1093/pnasnexus/pgaf325

Cambridge University Press. (n.d.). Mainstream media. In *Cambridge Dictionary*. Retrieved March 27, 2026, from https://dictionary.cambridge.org/us/dictionary/english/mainstream-media

Caretta, M. A., Rothrock, B. A., & Zegre, N. P. (2022). Exploring climate change perspectives: An analysis of undergraduate students' place-based attachment in Appalachia, USA. *Rural Sociology, 87*(3), 847–872. https://doi.org/10.1111/ruso.12433

Casteel, M. A. (2016). Communicating increased risk: An empirical investigation of the National Weather Service's impact-based warnings. *Weather, Climate, and Society, 8*(3), 219–232. https://doi.org/10.1175/WCAS-D-15-0044.1

Clarke, I. (2024). The discourses of climate change denialism across conspiracy and pseudoscience websites. In S. M. Maci, M. Demata, M. McGlashan, & P. Seargeant (Eds.), *The Routledge handbook of discourse and disinformation* (pp. 325–341). Routledge. https://doi.org/10.4324/9781003224495-24

Clark, A., & Doan, L. (2025, July 10). False claims link cloud seeding to deadly Texas floods, despite "zero evidence." *CBS News*. https://www.cbsnews.com/news/texas-floods-cloud-seeding-false-claims/

Compton, J., van der Linden, S., Cook, J., & Basol, M. (2021). Inoculation theory in the post-truth era: Extant findings and new frontiers for contested science, misinformation, and conspiracy theories. *Social and Personality Psychology Compass, 15*(6), e12602. https://doi.org/10.1111/spc3.12602

Cordasco, K. M., Eisenman, D. P., Glik, D. C., Golden, J. F., & Asch, S. M. (2007). "They blew the levee": Distrust of authorities among Hurricane Katrina evacuees. *Journal of Health Care for the Poor and Underserved, 18*(2), 277–282. https://doi.org/10.1353/hpu.2007.0028

Costello, T. H., Pennycook, G., & Rand, D. G. (2024). Durably reducing conspiracy beliefs through dialogues with AI. *Science, 385*(6714), eadq1814. https://doi.org/10.1126/science.adq1814

Demuth, J. L., Lazo, J. K., & Morss, R. E. (2016). Exploring variations in people's sources, uses, and perceptions of weather forecasts. *Weather, Climate, and Society, 8*(3), 287–305. https://doi.org/10.1175/WCAS-D-15-0041.1

Doan, L., & Delzer, E. (2025, January 16). *Wildfire conspiracy theories are going viral again. Why?* CBS News. https://www.cbsnews.com/news/wildfire-conspiracy-theories-viral-fact-check/

Douglas, K. M., & Sutton, R. M. (2015). Climate change: Why the conspiracy theories are dangerous. *Bulletin of the Atomic Scientists, 71*(2), 98–106. https://doi.org/10.1177/0096340215571908

Douglas, K. M., Sutton, R. M., & Cichocka, A. (2017). The psychology of conspiracy theories. *Current Directions in Psychological Science, 26*(6), 538–542. https://doi.org/10.1177/0963721417718261

Dow, K., & Cutter, S. L. (1998). Crying wolf: Repeat responses to hurricane evacuation orders. *Coastal Management, 26*(4), 237-252. https://doi.org/10.1080/08920759809362356

Drabek, T. E. (2018). *The human side of disaster*. CRC Press.

Enders, A. M., & Smallpage, S. M. (2019). Informational cues, partisan-motivated reasoning, and the manipulation of conspiracy beliefs. *Political Communication*, *36*(1), 83-102. https://doi.org/10.1080/10584609.2018.1493006

Federal Emergency Management Agency. (n.d.). *Individual assistance library*. https://www.fema.gov/assistance/individual/library

Federal Emergency Management Agency. (n.d.). *Hurricane rumor response*. https://www.fema.gov/disaster/recover/rumor/hurricane-rumor-response

Fogg, B. J., Marshall, J., Laraki, O., Osipovich, A., Varma, C., Fang, N., & Treinen, M. (2003). What makes web sites credible? In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 61–68). Association for Computing Machinery. https://doi.org/10.1145/365024.365037

Freedman, A. (2025, May 5). *A militarized conspiracy theorist group believes radars are "weather weapons" and is trying to destroy them*. CNN. http://cnn.com/2025/05/05/weather/weather-weapons-nws-radar-attack

Glikson, E., & Woolley, A. W. (2020). Human trust in artificial intelligence: Review of empirical research. *Academy of Management Annals, 14*(2), 627–660. https://doi.org/10.5465/annals.2018.0057

Green, M., McShane, C. J., & Swinbourne, A. (2022). Active versus passive: Evaluating the effectiveness of inoculation techniques in relation to misinformation about climate change. *Australian Journal of Psychology, 74*(1), 2113340. https://doi.org/10.1080/00049530.2022.2113340

Hase, V., Mahl, D., Schäfer, M. S., & Keller, T. R. (2021). Climate change in news media across the globe: An automated analysis of issue attention and themes in climate change coverage in 10 countries (2006–2018). *Global Environmental Change, 70*, 102353. https://doi.org/10.1016/j.gloenvcha.2021.102353

Hess, D. J., & Maki, A. (2019). Climate change belief, sustainability education, and political values: Assessing the need for higher-education curriculum reform. *Journal of Cleaner Production, 228*, 1157–1166. https://doi.org/10.1016/j.jclepro.2019.04.291

Hiar, C. (2026, January 29). A startup blamed for deadly floods is pitching cloud seeding to lawmakers. *E&E News*. https://www.eenews.net/articles/a-startup-blamed-for-deadly-floods-is-pitching-cloud-seeding-to-lawmakers/

Holder, F., Mirza, S., Carbone, J., & McKie, R. E. (2023). Climate obstruction and Facebook advertising: how a sample of climate obstruction organizations use social media to disseminate discourses of delay. *Climatic Change*, *176*(2), 16. https://doi.org/10.1007/s10584-023-03494-4

Houston, J. B., Hawthorne, J., Perreault, M. F., Park, E. H., Hode, M. G., Halliwell, M. R., & Griffith, S. A. (2015). Social media and disasters: A functional framework for social media use in disaster planning, response, and research. *Disasters, 39*(1), 1–22. https://doi.org/10.1111/disa.12092

Jack, A., & Panchal, R. (2021). Soaring seas, forest fires and deadly drought: Climate change conspiracies and mental health. *BJPsych Bulletin, 45*(4), 210–215. https://doi.org/10.1192/bjb.2021.7

Johnson, D. R. (2017). Improving skeptics' reasoning when evaluating climate change material: A cognitive intervention. *Ecopsychology, 9*(3), 130–142. https://doi.org/10.1089/eco.2017.0012

Kahan, D. M. (2013). Ideology, motivated reasoning, and cognitive reflection. *Judgment and Decision Making*, *8*(4), 407-424. https://doi.org/10.1017/S1930297500005271

Kapucu, N. (2008). Collaborative emergency management: better community organising, better public preparedness and response. *Disasters*, *32*(2), 239-262. https://doi.org/10.1111/j.1467-7717.2008.01037.x

Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., ... & Ratick, S. (1988). The social amplification of risk: A conceptual framework. *Risk Analysis*, *8*(2), 177-187. https://doi.org/10.1111/j.1539-6924.1988.tb01168.x

Kennedy, B., Tyson, A., & Saks, E. (2023, February 15). *Public awareness of artificial intelligence in everyday activities: Limited enthusiasm in U.S. over AI's growing influence in daily life*. Pew Research Center. https://www.pewresearch.org/science/2023/02/15/public-awareness-of-artificial-intelligence-in-everyday-activities/

Klinkhammer, D. (2024). Misuse of large language models: Exploiting weaknesses for target-specific outputs. *TATuP-Zeitschrift für Technikfolgenabschätzung in Theorie und Praxis/Journal for Technology Assessment in Theory and Practice*, *33*(2), 29-34. https://doi.org/10.14512/tatup.33.2.29

Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin*, *108*(3), 480.

Landrum, A. R., Olshansky, A., & Richards, O. (2021). Differential susceptibility to misleading flat earth arguments on youtube. *Media Psychology*, *24*(1), 136-165. https://doi.org/10.1080/15213269.2019.1669461

Lazo, J. K., Morss, R. E., & Demuth, J. L. (2009). 300 billion served: Sources, perceptions, uses, and values of weather forecasts. *Bulletin of the American Meteorological Society, 90*(6), 785–798. https://doi.org/10.1175/2008BAMS2604.1

Lees, J., Banas, J. A., Linvill, D., Meirick, P. C., & Warren, P. (2023). The Spot the Troll Quiz game increases accuracy in discerning between real and inauthentic social media accounts. *PNAS Nexus, 2*(4), pgad094. https://doi.org/10.1093/pnasnexus/pgad094

Lewandowsky, S., & Cook, J. (2020). *The conspiracy theory handbook*. University of Queensland.

Lewandowsky, S. (2021). Climate change disinformation and how to combat it. *Annual Review of Public Health, 42*(1), 1–21. https://doi.org/10.1146/annurev-publhealth-090419-102409

Lewandowsky, S., Ecker, U. K., & Cook, J. (2017). Beyond misinformation: Understanding and coping with the "post-truth" era. *Journal of Applied Research in Memory and Cognition*, *6*(4), 353-369. https://doi.org/10.1016/j.jarmac.2017.07.008

Lewandowsky, S., Cook, J., & Lloyd, E. A. (2017). The "Alice in Wonderland" mechanics of the rejection of science. *Synthese, 195*(1), 175–195. https://doi.org/10.1007/s11229-016-1197-6

Lewandowsky, S., Ecker, U. K. H., Seifert, C. M., Schwarz, N., & Cook, J. (2012). Misinformation and its correction: Continued influence and successful debiasing. *Psychological Science in the Public Interest, 13*(3), 106–131. https://doi.org/10.1177/1529100612451018

Lewandowsky, S., Gignac, G. E., & Oberauer, K. (2013). The role of conspiracist ideation and worldviews in predicting rejection of science. *PLoS One*, *8*(10), e75637. https://doi.org/10.1371/journal.pone.0075637

Lindell, M. K., & Perry, R. W. (2012). The protective action decision model: Theoretical modifications and additional evidence. *Risk Analysis, 32*(4), 616–632. https://doi.org/10.1111/j.1539-6924.2011.01647.x

Lindell, M. K. (2017). Communicating imminent risk. In H. Rodríguez et al. (Eds.), *Handbook of disaster research* (pp. 449-477). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-63254-4_22

McGuire, W. J. (1961). The effectiveness of supportive and refutational defenses in immunizing and restoring beliefs against persuasion. *Sociometry, 24*(2), 184–197. https://www.jstor.org/stable/2786067

McGuire, W. J. (1964). Inducing resistance to persuasion: Some contemporary approaches. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 1, pp. 191–229). Academic Press. https://doi.org/10.1016/S0065-2601(08)60052-0

Meirick, P. C. (2022). Television news, political comedy, party, and political knowledge in global warming belief: Evidence from a large-scale panel survey. *Science Communication*, *44*(4), 494-513. https://doi.org/10.1177/10755470221119839

Mendy, L., Karlsson, M., & Lindvall, D. (2024). Counteracting climate denial: A systematic review. *Public Understanding of Science, 33*(4), 504–520. https://doi.org/10.1177/09636625231223425

Meyer, M., Enders, A., Klofstad, C., Stoler, J., & Uscinski, J. (2024). Using an AI-powered "street epistemologist" chatbot and reflection tasks to diminish conspiracy theory beliefs. *Harvard Kennedy School (HKS) Misinformation Review, 5*(6). https://doi.org/10.7910/DVN/F6GHL7

Mileti, D. S., & Sorensen, J. H. (1990). *Communication of emergency public warnings: A social science perspective and state-of-the-art assessment* (No. ORNL-6609). Oak Ridge National Lab., TN (USA). https://doi.org/10.2172/6137387

Mitchell, M., Wu, S., Zaldivar, A., Barnes, P., Vasserman, L., Hutchinson, B., ... & Gebru, T. (2019, January). Model cards for model reporting. In *Proceedings of the conference on fairness, accountability, and transparency* (pp. 220-229). https://doi.org/10.1145/3287560.3287596

Morss, R. E., Demuth, J. L., & Lazo, J. K. (2008). Communicating uncertainty in weather forecasts: A survey of the U.S. public. *Weather and Forecasting, 23*(5), 974–991. https://doi.org/10.1175/2008WAF2007088.1

Morsut, C., Kuran, C., Kruke, B. I., Orru, K., & Hansson, S. (2022). Linking resilience, vulnerability, social capital and risk awareness for crisis and disaster research. *Journal of Contingencies and Crisis Management, 30*(2), 137–147. https://doi.org/10.1111/1468-5973.12375

Newman, N., Fletcher, R., Eddy, K., Robertson, C. T., & Nielsen, R. K. (2023). Digital news report 2023. Reuters Institute for the Study of Journalism. https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2023

Nguyen, C. T. (2020). Echo chambers and epistemic bubbles. *Episteme*, *17*(2), 141-161. https://doi.org/10.1017/epi.2018.32

Nicolosi, E., Medina, R., Brewer, S., Vorkink, M., & Allred, A. (2025). The new denial: Climate solution misinformation on social media. *Global Sustainability*, *8*, e31. https://doi.org/10.1017/sus.2025.10016

Nilsen, E. (2024, October 9). What to know about FEMA's $750 hurricane disaster payments. *CNN*. https://www.cnn.com/2024/10/09/politics/fema-750-hurricane-disaster-payment-assistance-what-to-know

Nyhan, B., & Reifler, J. (2010). When corrections fail: The persistence of political misperceptions. *Political Behavior*, *32*(2), 303-330. https://doi.org/10.1007/s11109-010-9112-2

Parker, K. A., Ivanov, B., & Compton, J. (2012). Inoculation's efficacy with young adults' risky behaviors: can inoculation confer cross-protection over related but untreated issues?. *Health Communication*, *27*(3), 223-233. https://doi.org/10.1080/10410236.2011.575541

Ripberger, J. T., Silva, C. L., Jenkins-Smith, H. C., & Carlson, D. E. (2014). False alarms and missed events: The impact and origins of perceived inaccuracy in tornado warning systems. *Risk Analysis, 34*(1), 44–56. https://doi.org/10.1111/risa.12262

Roozenbeek, J., & van der Linden, S. (2019). Fake news game confers psychological resistance against online misinformation. *Palgrave Communications, 5*(1), 65. https://doi.org/10.1057/s41599-019-0279-9

Shin, D. (2024). Misinformation and inoculation: Algorithmic inoculation against misinformation resistance. In *Artificial misinformation: Exploring human-algorithm interaction online* (pp. 197–226). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-52569-8_8

Simon, F. M., Nielsen, R. K., & Fletcher, R. (2025, October 7). *Generative AI and news report 2025: How people think about AI's role in journalism and society*. Reuters Institute for the Study of Journalism. https://reutersinstitute.politics.ox.ac.uk/generative-ai-and-news-report-2025-how-people-think-about-ais-role-journalism-and-society

Singh, J., & Bajwa, A. (2026, February 13). *Musk's AI chatbot Grok gains U.S. market share amid sexualized images backlash, data shows*. Reuters.

https://www.reuters.com/business/media-telecom/musks-ai-chatbot-groks-us-market-share-jumps-amid-sexualized-images-backlash-2026-02-13/

Sirlin, N., Epstein, Z., Arechar, A. A., & Rand, D. G. (2021). Digital literacy and susceptibility to misinformation. *Harvard Kennedy School (HKS) Misinformation Review*, *2*(6).

Stevenson, K. T., Peterson, M. N., Bondell, H. D., Moore, S. E., & Carrier, S. J. (2014). Overcoming skepticism with education: Interacting influences of worldview and climate change knowledge on perceived climate change risk among adolescents. *Climatic Change, 126*, 293–304. https://doi.org/10.1007/s10584-014-1228-7

Strickler, L., Alexander, P., & Guilfoil, K. (2024, October 4). *False claims about FEMA disaster funds for migrants pushed by Trump*. NBC News. https://www.nbcnews.com/politics/donald-trump/false-claims-fema-disaster-funds-migrants-pushed-trump-rcna173955

Sundar, S. S. (2008). The MAIN model: A heuristic approach to understanding technology effects on credibility. In *Digital media, youth, and credibility* (pp. 73–100). MIT Press.

Tam, K. P., & Chan, H. W. (2023). Conspiracy theories and climate change: A systematic review. *Journal of Environmental Psychology, 91*, 102129. https://doi.org/10.1016/j.jenvp.2023.102129

Tierney, K. (2019). *Disasters: A sociological approach*. Polity Press.

Treen, K., Williams, H., O'Neill, S., & Coan, T. G. (2022). Discussion of climate change on Reddit: Polarized discourse or deliberative debate? *Environmental Communication*, *16*(5), 680-698. https://doi.org/10.1080/17524032.2022.2050776

University of Washington Center for an Informed Public. (2024, October 9). *Making sense of election rumors emerging from Hurricane Helene*. https://www.cip.uw.edu/2024/10/09/hurricane-helene-election-rumors/

Uscinski, J. E., & Parent, J. M. (2014). *American conspiracy theories*. Oxford University Press.

van der Linden, S., Leiserowitz, A., Rosenthal, S., & Maibach, E. (2017). Inoculating the public against misinformation about climate change. *Global Challenges, 1*(2), 1600008. https://doi.org/10.1002/gch2.201600008

van der Linden, S., Roozenbeek, J., & Compton, J. (2020). Inoculating against fake news about COVID-19. *Frontiers in Psychology, 11*, 566790. https://doi.org/10.3389/fpsyg.2020.566790

van Der Linden, S. (2022). Misinformation: Susceptibility, spread, and interventions to immunize the public. *Nature Medicine*, *28*(3), 460-467. https://doi.org/10.1038/s41591-022-01713-6

Van Dijk, J. A. (2005). *The deepening divide: Inequality in the information society*. Sage Publications.

Vargas, R. A. (2024, October 15). *Man arrested over alleged violent threat against FEMA staff in North Carolina*. The Guardian. https://www.theguardian.com/us-news/2024/oct/15/fema-threats-arrest-hurricane-helene

Vosoughi, S., Roy, D., & Aral, S. (2018). The spread of true and false news online. *Science, 359*(6380), 1146–1151. https://doi.org/10.1126/science.aap9559

Wang, J., & Tanes-Ehle, Z. (2023). Examining the effects of conversational chatbots on changing conspiracy beliefs about science: The paradox of interactivity. *Journal of Broadcasting & Electronic Media, 67*(1), 68–89. https://doi.org/10.1080/08838151.2022.2153842

Wright, K. B. (2022). Social media misinformation about extreme weather events and climate change: Structures, communication processes, and individual factors that influence the diffusion of misinformation. In H. D. O'Hair & M. J. O'Hair (Eds.), *Communication and catastrophic events: Strategic risk and crisis management* (pp. 137–154). Wiley. https://doi.org/10.1002/9781119751847.ch9

Appendix

1. AI Chatbot Supplemental Material

The following materials were used within the AI chatbot interaction phase of the study. These include the standardized chatbot coding, internal instruction commands, and the list of conversation topics presented to participants in both the control and experimental conditions.

A) Chatbot instructions

You are a research chatbot in the {experimental/control} condition.

FIXED 10-TURN STRUCTURE (FOLLOW EXACTLY):

- Turn 1 (user): greeting ("hi/hello")
- Turn 2 (assistant): ask for PLATFORM (SONA/Prolific) and PARTICIPANT_ID
- Turn 3 (user): provides PLATFORM + PARTICIPANT_ID → store both
- Turn 4 (assistant): send the EXACT introductory message + topic list (provided below).
    - Call logTranscript and then STOP and wait.
- Turn 5 (user): first paragraph
- Turn 6 (assistant): 250–300 word reply (opposing view).
    - Call logTranscript and then STOP and wait.
- Turn 7 (user): second message
- Turn 8 (assistant): 250–300 word reply.
    - Call logTranscript and then STOP and wait.
- Turn 9 (user): third message
- Turn 10 (assistant): final 250–300 word reply
    - Required closing sentence and the call logTranscript
- Conversation ends permanently.

HARD RULES:

- NEVER skip a user turn. NEVER send two assistant messages in a row.
- NEVER ask the user additional questions.
- NEVER shorten or alter the required verbatim text below.
- NEVER continue past Turn 10.
- NEVER simulate user messages.

TURN 4 — REQUIRED VERBATIM MESSAGE **{control condition}**:

"Welcome, today you will be selecting a specific topic from the options below for us to have a short conversation over. From the statements provided, please select the one that you would like to talk with me about and provide me with a paragraph of at least 3-4 sentences. This paragraph

should introduce and explain the statement to me, outline your thoughts on it, and then point out anything you would like my opinion on. The conversation will end after each party submits three responses, so please make sure all information you want to be discussed is included in your responses in order for me to have a successful conversation with you. Note, your first message where you explain the chosen statement to me will count as one of the three responses you get. Now what would you like to talk with me about today?"

TURN 4 — REQUIRED VERBATIM MESSAGE **{experimental condition}**:

"Welcome, today you will be selecting a specific weather or climate science topic from the options below for us to have a short conversation over. From the statements provided, please select the one that you would like to talk with me about and provide me with a paragraph of at least 3-4 sentences. This paragraph should introduce and explain the statement to me, outline your thoughts on it, and then point out anything you would like my opinion on. The conversation will end after each party submits three responses, so please make sure all information you want to be discussed is included in your responses in order for me to have a successful conversation with you. Note, your first message where you explain the chosen statement to me will count as one of the three responses you get. Now what would you like to talk with me about today?"

CONTENT & TONE RULES:

- Your three replies (Turns 6, 8, 10) must be 250–300 words.
- Always argue the *non-conspiratorial* side, politely and non-judgmentally.
- Do NOT label statements as "conspiracy theories," "false," "radical," etc.
    - Use neutral terms such as "statement" or "point."
- DO NOT ask leading or guiding questions.
- DO NOT prompt the user for longer answers.

TURN 10 — REQUIRED CLOSING SENTENCE:

"Thank you for taking the time to chat with me today and talk about this topic. Our conversation has met its response limit, which means our chat must come to an end. Please return back to the survey to complete the final steps of the study."

B) Control condition topics

The options for possible conversation topics are:

1. Pineapple belongs on pizza.
2. Cats are better than dogs.
3. Money can buy happiness.
4. It's better to be busy than bored.
5. People are happier when they live a minimalist lifestyle.
6. New Year's resolutions are a waste of time.
7. Dessert should be eaten before the main course.

8. People are more productive in messy spaces than clean ones.
9. Being spontaneous is better than being organized.
10. Online shopping is better than in-store shopping.
11. Taking photos ruins the moment.
12. Remote work makes people lonelier.
13. Cereal is a soup.
14. Texting is better than talking on the phone.
15. People post too much of their lives online.

C) Experimental condition topics

The options for possible conversation topics are:
1. Long-lasting condensation trails left in the sky by high-flying aircraft are "chemtrails" consisting of chemical or biological agents, sprayed for multiple purposes such as weather modification, population control, chemical warfare, or biological testing.
2. Climate change is a hoax and is really used to subdue the global population.
3. Hurricane Milton and Helene were steered by the democratic led government to impact historically republican states to aid their electoral votes in the upcoming election.
4. Cloud seeding enhances hurricanes to make them more dangerous.
5. The High-frequency Active Aurora Research Program (HAARP) in Alaska modifies the weather to cause extreme weather events and natural disasters.
6. Climate change is an idea orchestrated by an elite group in order to control markets through their economic and climate change mitigation policies.
7. The government can manipulate the drought season/droughts through weather modification systems for geopolitical and financial gain.
8. The Federal Emergency Management Association (FEMA) disaster recovery funds were allocated and redirected to be used towards illegal immigrants coming into the country, causing little to no funds to be dispersed to those impacted by Hurricane Helene and Milton.
9. The 2025 Kerr County (Camp Mystic), Texas catastrophic flooding was caused by cloud seeding.
10. Major wildfires are actually the result of directed energy weapons (DEWs), not natural causes.
11. Severe weather events and natural disasters are orchestrated by politicians to distract from what they're really doing behind the scenes.
12. The Earth is flat.
13. Climate data extremes that are spread by scientists are made to deceive the population to help push forward specific political agendas in the United States.
14. The levee system to reduce flood impacts was bombed or sabotaged during Hurricane Katrina, causing the catastrophic flooding to minority communities.

15. FEMA was purposely withholding aid from specific areas impacted by the California wildfires in 2024 and 2025 due to their political beliefs.