

Communicating climate-change impacts to youth: A social influence theory perspective

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Abstract

Climate change is known to have severe impacts on Earth's temperature, organisms, human health, and habitats. Despite overwhelming scientific evidence, many individuals hold misbeliefs about climate change. Misbeliefs can prevent policy changes or environmental action to reduce climate-change impacts from taking place. Previous scholars have addressed the potential causes behind these misbeliefs, including misinformation, confirmation bias, and tribalism. Since current solutions have not yet significantly reduced these misbeliefs or their causes, this report explores the issue using a social influence theory perspective. By synthesizing literature on social influence theory, climate-change communication, and the use of youth groups and activities for education, it is concluded that communicating to youth groups and their leaders about climate-change impacts could produce the greatest change in reducing misbeliefs. This is due to the combination of normative social influence, leadership and mentorship influence, and healthy environments in youth group structures. These findings inform a communication plan for reducing misbeliefs about climate in youth groups in low socioeconomic areas of Kansas. By educating youth about climate change, we can significantly reduce misbeliefs overall through generational replacement and allow more policy changes and environmental actions to be implemented to reduce climate-change impacts.

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Chapter 1: Introduction

Climate change is “a long-term change in the average weather patterns that have come to define Earth’s local, regional and global climates” (Shaftel, 2023, para. 1). The existence of this phenomenon is supported by overwhelming scientific evidence, namely climate change’s impacts on global temperature rate, human health, habitats, animals, glaciers, and natural disasters. One of the most notable pieces of evidence and impacts of climate change is the increase in global temperature. Rohde and Hausfather (2020) specifically noted a rapid warming of air temperatures in the Arctic while they were comparing temperature records from different datasets. Mills et al. (2019) established a correlation between the Phanerozoic surface temperature and CO₂ greenhouse variations, which is consistent with previous research. Skripnuk and Samylovskaya (2018) found that the average global temperature depends on numerous factors including human activity. The authors suggest that the increase in global temperature could be due to population increase. Increases in population lead to higher carbon emissions, which contributes to the overall global warming. The increase in global temperature can lead to other climate-change impacts as well.

For example, Matzarakis and Amelung (2008) found that the anticipated climate change will produce thermal conditions that will affect the health and well-being of humans and lead to higher energy consumption due to humans trying to counteract those effects. They used Physiologically Equivalent Temperature (PET) to analyze how thermal changes affect human health. PET allows for the “evaluation of thermal conditions in a physiologically significant manner” (Matzarakis & Amelung, 2008, p. 166). The authors noted that previous studies on this subject focused solely on correlating air temperature and relative humidity with human health

factors, where PET factors in more variables to achieve a more significant result. Their results demonstrate the significant effects of temperature increase on human health.

Climate change can also affect habitats. Hönisch et al. (2012) explains how increased CO₂ emissions can lead to ocean acidification, which changes the resources, such as calcium carbonate, used by the organisms living in that habitat. Pelletier et al. (2011) found that gullies, which are vertical-walled channels in hillslopes and valleys, can be caused by human activity or climate change. Gullies are environmentally significant; they are a major habitat for beneficial insects in agricultural watersheds (Zhang et al., 2023). Poesen et al. (2003) also explains how gully erosion can remove soil from an area and affect agriculture.

Along with habitats, climate change can also affect organisms. Cavicchioli et al. (2019) studied how microorganisms can affect climate change and how they can be affected by climate change. Climate change influences the structure and diversity of microbial communities through temperature, precipitation, soil properties, and other factors. Johnson et al. (2017) found that while biodiversity losses are mainly due to human causes, climate change can contribute: “rising temperature variability increases the susceptibility of amphibians to disease” (p. 3). Changes in global temperatures have impacts on other Earth features as well, including glaciers.

Glacial melting is one of the more well-known consequences of climate change. Hornsey et al. (2022) found that climate change is causing rapid changes in Himalayan glaciers. Pruessner et al. (2022) explain how glacial retreating caused by climate change is reducing glacier runoff, which is crucial to water supplies in areas such as Central Asia. Glacial melting can also cause rises in sea level, which have consequences of their own (Chen et al., 2013). Howcutt et al. (2023) found, however, that glaciers near volcanoes are sensitive to volcanic heat, so they should be excluded from research on climate-change induced glacial melting.

Climate change can also increase natural disasters. Abatzoglou and Williams (2016) found that human-caused climate change nearly doubled the occurrence of forest fires in the western United States from 1984 to 2015. Temperature and vapor pressure increases caused by climate change contribute to fuel aridity, or the drying out of forests. This leads to a higher probability of forest fires. Nyman et al. (2019) explain how increased debris flows in Australia are linked to increased wildfires, heavy rainfall, and climate oscillations. Finally, earthquakes can also be induced by climate change. Kim and Lee (2023) found that sea-level rise brought on by climate change can increase fault activity, which increases the possibility of earthquakes.

Types of Climate-Change Misbeliefs

Given the severe, literally earth-changing impacts of climate change, the public should be well-informed so that they might take appropriate action; however, many individuals hold misbeliefs about climate change. Multiple misbeliefs about climate change should be addressed, including those about the existence of climate change, the impacts of climate change, and the human contribution to climate change. According to the Yale Program on Climate Change Communication, majority of Americans in 2023 believe in the existence of climate change (Leiserowitz et al., 2023, December 14). Only 11 percent of the United States completely deny climate change, but that represents over 36 million people. This is about 10 million more people than the top ten most populous cities in the United States combined (World Population Review, 2024). While this is a concerning number of people, I will not focus on misbeliefs regarding the existence of climate change since the majority of Americans believe that climate change exists. Rather, misbeliefs about the impacts of climate change will now be discussed.

The Pew Research Center reports that 54 percent of Americans believe climate change is a major threat (Tyson et al., 2023). According to the same report, 75 percent of Americans

believe strengthening the economy should be a top priority for the government, whereas only 37 percent believe climate change should be a top priority. While the majority of Americans believe climate change has local impacts (Leiserowitz et al., 2023, June 8; Tyson et al., 2023), only 36 percent of surveyed Republicans were a part of this majority (Tyson et al., 2023).

Lu et al. (2019) found that temperature variation from climate change caused a negative impact on economic development. They used a trans-log production function model to correlate the economy in Nanjing with the area's rainfall and temperature from 1996 to 2017. This study, and others like it (Bigano et al., 2008; Lal et al., 2011), demonstrates that reducing climate change could potentially improve the economy. This would address the surveyed Americans' concerns in the Pew Research Center study (Tyson et al., 2023). If the public understands the impacts of climate change on the economy, environment, and Earth overall, it will be more motivated to help reduce climate change. However, this possibility is contingent upon whether Americans believe humans contribute to climate change.

The Yale Program on Climate Change Communication reports that 61 percent of Americans believe that climate change is mostly caused by humans, while 28 percent believe climate change is mostly caused by natural climate cycles (Leiserowitz et al., 2023, June 8). Hartter et al. (2018) questioned whether it matters if people believe in the human causes of climate change. The authors concluded that if people believe climate change is only due to natural climate cycles, then they may feel helpless in reducing climate change. The public needs to understand humans' contribution to climate change so they will support policies to reduce climate-change impacts (Hartter et al., 2018). Hornsey and Fielding (2020) studied the causes of inaction against climate change and concluded that humans must have a desire to reduce climate change. Even if the public believes climate change is partly caused by humans, it will not support

policies to reduce climate change if it does not have the motivation to do so. Therefore, this report will focus on reducing misbeliefs about the impacts of climate change. As demonstrated by aforementioned research in this report, climate change affects global temperatures, habitats, animals, human health, glaciers, and natural disasters. The public needs to be well informed about the impacts of climate change so it will be more motivated to engage in environmentally friendly behaviors and support policies to reduce climate change.

Theoretical perspectives on climate-change misbeliefs

A significant number of individuals, even when confronted with unbiased scientific evidence, have misbeliefs about climate change. The causes of beliefs about climate change that contradict overwhelming scientific evidence are complex, and solutions remain elusive despite a great deal of social-scientific research. Zhou and Shen (2021) focused on confirmation bias and misinformation in their study. Helmuth et al. (2016) looked at climate change and polarization on social media through a tribalism perspective. This study considers climate-change beliefs through the lens of social influence theory. Social influence theory, first proposed by Kelman (1958), could help explain why some individuals are more likely to change their beliefs based on new information about climate change and why other individuals are not.

Thus, in this chapter, I first briefly review current social-science understanding of climate-change beliefs from the theoretical perspectives of misinformation, confirmation bias, and tribalism, respectively. This will include the origins of these concepts, the influence of these concepts on politics, science news, and social media, and the tactics being used to reduce the effects of these concepts. I then introduce social influence theory and make a case for its potential for understanding variations in climate-change beliefs and to inform communication

strategies. Finally, I explain the significance of the problem and solution addressed in this report and detail my methods for solving the problem.

Misinformation

Wu et al. (2019) define misinformation as “false or inaccurate information that is deliberately created and is intentionally or unintentionally propagated” (p. 80). The problem of misinformation dates to the Roman empire around 44 B.C., when Octavian created a campaign against Antony to ruin his reputation; to World War I, when propaganda helped recruitment efforts; and to 2016, when “fake news” about the presidential candidates circulated on social media (Posetti & Matthews, 2018). This report will specifically consider scientific misinformation. Southwell et al. (2022) define scientific misinformation as “publicly available information that is misleading or deceptive relative to the best available scientific evidence and that runs contrary to statements by actors or institutions who adhere to scientific principles” (p. 98). Scientific misinformation has reached crisis levels, and West and Bergstrom (2021) believe this crisis can be traced to the source of science information, namely the authors and publishers. According to West and Bergstrom (2021), sources are to blame for publication bias, citation bias, and predatory publishing before news consumers access the information.

Wu et al. (2019) examined misinformation on social media, and they found that there are several types of misinformation, ways of manipulating misinformation, and ways of detecting misinformation. Allcott et al. (2019) studied the trends of misinformation on Facebook and Twitter between 2015 and 2018; they found that engagement with misinformation increased on Facebook and Twitter from 2015 to the end of 2016. From the end of 2016 to the end of the study, engagement with misinformation on Facebook decreased while engagement with misinformation on Twitter increased; the authors cautiously suggested that the addition of fact

checkers to Facebook's platforms after 2016 could have contributed to the decrease (Allcott et al., 2019).

Researchers have explored other tactics to combat misinformation as well. Kim et al. (2021) used an eye tracking approach to study humorous versus non-humorous corrections of misinformation on the HPV virus; they found that both strategies could potentially be used in future campaigns to correct misinformation. Kreps and Kriner (2022) studied interventions against misinformation on COVID-19 and found that journalistic factchecks were more effective than false tags in combating the misinformation. Chen et al. (2023) synthesized more than 400 articles and found that there were five approaches used to combat misinformation: source-based, message-based, network-based, policy-based, and education-based. The study revealed, however, that there are still many gaps in this research and future studies are needed to determine the effectiveness of these strategies. Since the long-term effects of these strategies on misinformation are not clear, the role of confirmation bias in climate-change misbeliefs will now be addressed.

Confirmation bias

Oswald and Grosjean (2004) explain that the concept of confirmation bias, originally developed by Peter Wason (1960), suggests that individuals search for, interpret, and remember information in a way that will ensure their hypothesis is accepted. Although the concept has been studied for decades, studies have shown that confirmation bias has recently been more prominently displayed by online media users (Westerwick et al., 2020). Pearson and Knobloch-Westerwick (2019) investigated consumers' confirmation bias in print and online media, specifically studying the difference between liberals and conservatives. They found that liberals displayed less confirmation bias in print media than online media, suggesting that

communicating through print media could potentially reduce consumers' confirmation bias. Westerwick et al. (2020) also studied users' confirmation bias in online media by comparing user-generated content and professional media messages. They found that users more often displayed confirmation bias in user-generated content when the users felt strongly about the political issue being addressed. Both Pearson and Knobloch-Westerwick (2019) and Westerwick et al. (2020) propose that the reason behind increased confirmation bias among online media consumers could be that selectivity is facilitated by the internet. Consumers were found to spend more time selecting information on online media, leading them to be more strongly influenced by their pre-existing attitudes (Pearson & Knobloch-Westerwick, 2019).

Confirmation bias is also prominently displayed by consumers of science news. Meppelink et al. (2019) studied perceptions of information and news stories about vaccination. They found that participants more often selected belief-consistent information and found it to be more credible. Participants with higher health literacy also displayed more biased selection and perceptions than those with lower health literacy. Zhou and Shen (2022) studied individuals' confirmation bias relating to climate-change information. The results showed that confirmation bias was prominently displayed by participants in message and source perception when they were confronted with climate-change information that was consistent with their beliefs. These studies show that individuals are more likely to select and evaluate messages positively when the messages are consistent with their beliefs, and those with higher science literacy have greater confidence in their beliefs than those with lower science literacy (Meppelink et al., 2019; Zhou & Shen, 2022). Thus, the people most needing to be wary of biased processing likely will be the hardest to reach, given their relatively high knowledge and confidence.

Several studies have considered tactics for reducing individuals' confirmation bias. van Brussel et al. (2020) proposed the consider-the-opposite strategy, which involves individuals developing their own counterarguments to challenge their initial judgments. They tested the effectiveness of different types of feedback given to individuals using this strategy and found that there were no significant differences between the learning of individuals who received elaborative feedback and those who received correct-answer feedback. However, the results also showed that participants who received feedback got higher scores on the confirmation-bias problems than those who did not receive feedback. Other studies suggested reducing individuals' confirmation bias through tactics such as using linked, open-data knowledge repository (Lee & Park, 2020), offering convincing counter-narratives (White, 2022), and offering preference-inconsistent recommendations (Schwind & Buder, 2012). Each of these studies, however, explained their various limitations and suggested that future research must be performed. Since not one of these strategies convincingly overcame confirmation bias, a third perspective on climate-change misbeliefs, namely tribalism, merits consideration.

Tribalism

Tribalism is defined as “an evolved tendency to favor ingroup members as opposed to outgroup members” (Jaquet, 2022, p. 934). Although the human formation of tribes dates back at least 50,000 years, if not longer (Jaquet, 2022), it is still around today. In his book, *The Social Conquest of Earth*, E. O. Wilson explains how modern groups are equivalent to tribes in ancient times, and that being a part of a tribe, or group, gives humans “social meaning” (2012). Wilson (2012) also explains how easy it is for humans to form groups, favor the groups in which they belong, and discriminate against the groups in which they do not belong. Some modern “tribes”

include families, followers of the same religion, students at the same university, or fans of the same athletic team or rock band (Jaquet, 2022).

Contemporary scholars commonly use the theory of tribalism while studying political parties. Clark et al. (2019) performed a study on the biases of liberals and conservatives. They found that both parties prominently displayed tribal biases, suggesting that no group of humans is immune to tribalism (Clark et al., 2019). Whitt et al. (2021) used tribalism to study partisan polarization. The study found that individuals who identify with a political party are more likely to experience affective polarization than those who do not identify with a political party. From these results, the authors suggest increasing inter-group contact to build trust, which would, therefore, decrease affective polarization (Whitt et al., 2021).

Tribalism also has implications for the interactions between individuals on social media. Lawson et al. (2023) studied the sharing of fake news on Twitter and how it relates to user groups and social costs. The authors found that users were subjected to reduced social interaction over time when they did not conform to their group and share fake news. Helmuth et al. (2016) explored how polarization on Twitter affected how climate change is viewed in politics. The results showed that Twitter social networks reflected political affiliation and that an interest in science was more often displayed by Democrats. Helmuth et al. (2016) suggest communicating science information to individuals and organizations that are connected to both parties to help resolve polarization on social media.

Some scholars have tried to reduce the effects of tribalism on communication. Kelman et al. (2015) propose combining climate-change campaign efforts with disaster risk reduction to reduce tribalism. The idea is to create a more positive outlook on climate-change efforts by connecting it to reducing the risk of disasters, thus decreasing polarization. Ind and Watt (2006)

offer another option, explaining how focusing on the formation and structure of groups can help reduce tribalism. The authors suggest not forcing people into groups, and instead approaching groups that have already been formed; this increases the chances of the group members already trusting each other. They also encourage establishing equal responsibility among group members and promoting a more positive work environment with less micromanagement to stimulate creativity and build trust (Ind & Watt, 2006). Overall, literature on combating tribalism suggests approaching well-established groups instead of forcing individuals into groups and building trust among the group members, which sounds feasible but requires already-trusted group members to deliver scientifically sound climate information.

Taken together, literature on misinformation, confirmation bias, and tribalism shares a common theme: These phenomena can be found throughout most of human history but are still problems today despite countless efforts to combat them. Furthermore, suggested interventions focus on changing the mindsets of adult individuals. A better solution might be to address these problems at the source. Because open-mindedness decreases with aging (Edgcumbe, 2022), younger individuals are more likely to accept new information that contradicts their original beliefs. Ramey and Rose-Krasnor (2012) synthesized existing theory and research on the relationship between structured youth activities and positive youth development. They found that structured activities can provide opportunities for youth to increase competency, develop social skills, and build positive relationships. Positive and trusting relationships can provide an environment for educating youth on climate change. This possibility merits exploration as suggested by social influence theory.

Social influence theory

Deutsch and Gerard (1955) were two of the earliest scholars studying social influence, and they differentiated between two types: normative and informational. Normative social influence was defined as “an influence to conform with the positive expectations of another” and informational social influence was defined as “an influence to accept information obtained from another as *evidence* about reality” (Deutsch & Gerard, 1955, p. 629). Social influence theory was then developed by Herbert Kelman (1958) and states that an individual can be influenced by others in attitudes, beliefs, or actions through the following processes: compliance, identification, and internalization. Compliance suggests that an individual might accept influence from another person or group to receive a favorable reaction. Identification explains how an individual might accept influence from others to create or maintain a good relationship. Internalization occurs when an individual accepts influence from others because the resulting ideas and actions are intrinsically rewarding (Kelman, 1958).

This theory and its constructs have been utilized in studies of college-student attitudes, evolving online media presence, public opinion formation, and sustainability. Guimond (1999) studied the attitude changes of students at a military college using social influence constructs. The author found that students’ attitudes toward the military, but not their sociopolitical attitudes, were influenced by their peer groups. Kim and Hollingshead (2015) studied how social influence research evolved with the development of online media. They explain that Web 2.0, the newest form of online media, increased connectivity between individuals and “the number and variety of potential influence sources” (Kim & Hollingshead, 2015, p. 186). Social influence theory could help explain the relationship between college attendance and attitude change

towards climate change since diversity exposure in college can increase potential influence sources by exposing individuals to new people with varying worldviews (Bryant, 2011).

Moussaïd et al. (2013) studied public-opinion formation using the concept of social influence and observing the interactions among groups of people. They found that individuals were more confident in their opinion when interacting with other individuals who share the same opinion, which can lead to group consensus. Goldsmith and Goldsmith (2011) studied the effectiveness of social influence strategies in promoting sustainability. They found that the sustainability behaviors of families and individuals in households were “heavily influenced by socialization in the home and neighbourhood” (Goldsmith & Goldsmith, 2011, p. 177). Moussaïd et al. (2013) and Goldsmith and Goldsmith (2011) support the notion that individuals maintain consistent beliefs and enact the same behaviors when surrounded by other like-minded individuals. This principle could provide a causal explanation for individuals’ beliefs in climate change. Social influence could also be the answer to reducing misbelief in climate change. Since younger individuals are more open-minded to new information (Edgcumbe, 2022), and structured youth activities provide youth with an environment promoting trust and positive social influences (Ramey & Rose-Krasnor, 2012), educating the leaders of these youth groups could in turn inform the younger generation and over time, through generational replacement, overcome misbelief in climate change.

Therefore, this report will consider climate-change misbeliefs from the perspective of social influence theory. In doing so, I will seek to explain why a significant number of individuals have climate-change misbeliefs despite overwhelming scientific evidence from a social influence theory perspective. This answer will then inform my suggestion for communication interventions to prevent these misbeliefs in climate change. Ultimately, my

report will offer much-needed communication strategies, informed by theory and empirically supported by research.

Significance of the problem and solution

Given that climate change is a serious issue, it is important that the public be informed on it. However, there is usually a knowledge gap when it comes to scientific topics. According to Miller (2016), only 28% of Americans were scientifically literate in 2008. As of 2016, this number has not improved (Kappel & Holmen, 2019). Many Americans still do not believe that human activities contribute to climate change or that the impacts of climate change are significant. Understanding the causes of climate-change misbeliefs is a necessary first step in addressing the beliefs and resulting attitudes.

Looking at climate-change misbelief through social influence theory can provide a new perspective on why different groups of people hold varying beliefs on climate change. This perspective will also allow us to address climate-change misbelief at its source. As shown in the literature review, misinformation, confirmation bias, and tribalism have contributed to individuals' beliefs and attitudes. Because these phenomena describe how people process information, and because people have been influenced by these methods for a long time, they will be hard to eliminate completely (Lewandowsky et al., 2012). However, by using social influence to communicate with young individuals about climate change, educators might stop climate-change misbelief before it starts.

Report plan: Climate-change communication through social influence theory lens

This report consists of three chapters and an appendix. Chapter 1 introduces the problem of climate-change misbelief, the significance of researching this problem, and my methods for addressing the problem. Chapter 2 synthesizes relevant literature on social influence theory,

climate-change communication through the lens of social influence theory, and previous studies of youth-based activities and communication promoting clear, scientific thinking. Chapter 3 draws on the results of the literature review in chapter 2 to make recommendations for communication strategies for addressing climate-change misbelief. Finally, the appendix consists of a communication plan; it includes the recommended communication strategies from chapter 3 and a plan for implementation of these strategies.

Chapter 2 is a critical component of the report. In it, I synthesize academic research on social influence theory. I then look at climate-change communication literature through a social influence theory lens. I cover peer-reviewed scholarship on topics including climate-change communication, polarized beliefs about climate change, climate change on social media, and environmental communication strategies. These topics provided me with sufficient breadth for possible insights while remaining focused on climate-change misbelief. While my focus was on using social influence theory to examine climate-change misbelief, I also kept misinformation, confirmation bias, and tribalism in mind as I read existing research. The peer-reviewed scholarship was collected from the databases Communication and Mass Media Complete, Web of Science, PAIS, Psyche Abstracts, and Google Scholar. I reviewed all peer-reviewed articles on these databases that I could identify through keyword-searches relevant to my key theories, climate-change communication, and youth group learning.

Based on my review of social influence in promoting scientifically informed beliefs, I next considered what others have already studied regarding the use of youth-based activities and communications to promote clear, scientific thinking. These concepts could contribute to the climate-change communication strategies developed based on the results of the report. These research criteria focused my attention on certain causes behind individuals' misconceptions

about climate change, allowing me to recommend particular strategies for correct misbeliefs. Finally, I detailed in my report a communication plan informed by the literature review to effectively influence the beliefs of young people about climate change and its causes.

Chapter 2: Review of the Literature

Social influence theory

Social influence theory seeks to explain why people around us with socially valued traits influence our beliefs, attitudes, and decision-making. The theory can also explain how we can use this human phenomenon by communicating climate change to youth groups where individuals are surrounded by their peers and have a positive, well-educated, socially influential leader. This strategy has the potential to reduce misbeliefs about climate-change impacts over time. As previously mentioned in Chapter 1, social influence occurs through one of three processes: compliance, identification, and internalization (Kelman, 1958). The traits of social influence sources can affect the successfulness of these processes.

Social influence processes and socially valued traits

Sources with greater expertise, confidence, and other socially valued traits have greater influence over individuals' beliefs, attitudes, and decision-making than those that do not have these traits (Crano, 2000). Bagozzi and Kyu-Hyun (2002) articulate how "decision making is determined by multiple sources of social influences as well as by attitudinal processes" (p. 244). These authors studied the effects that personal and social factors have on individuals' intentions through social influence theory. Individual intentions were found to be functions of attitude for Koreans and functions of attitude and group norms for Americans. Shared intentions were found to be functions of social identity reactions for Koreans and functions of subjective and group norms for Americans. In their review and analysis of social influence models, Mason et al. (2007) determined that heterogeneous or dynamic networks were most effective for utilizing social influence. Their goal was to determine which models could account for the diversity of opinions involved in the social influence process over time. Their finding could be an important

consideration for developing communication strategies because it can inform the best audiences to target to produce long-lasting effects in reducing climate-change misbeliefs.

Using the burden of social proof and the wisdom of crowd effect to one's advantage

The burden of social proof and the wisdom-of-crowd effect can be undermined by social influence when an individual is consistently surrounded by other individuals with the same types of opinions. The burden of social proof explains the situation in which an individual needs to know that a certain number of other individuals have the same opposing opinion before that individual will change his or her opinion to the majority consensus (MacCoun, 2012). The wisdom-of-crowd effect explains the practice of averaging several individuals' opinions to conclude one's own opinion (Lorenz et al., 2011). Using the wisdom-of-crowd effect multiple times can create collective overconfidence in potentially false beliefs. This is exacerbated by the social influence effect, which states that the group diversity factor in the wisdom-of-crowd effect is decreased when a person is persuaded more by their social influence sources. One way to use these phenomena to one's advantage is to educate individuals' social influences, so the consensus opinion is the factually correct opinion.

Social influence through social media

While social media can be a potential channel for environmental campaigns, there are many gaps in online media social influence research. Chandrasekara et al. (2021) conducted a literature review to determine boundary conditions of social influence in social networking sites (SNS). Social influence constructs for SNS were found to be different from social influence constructs for the real world. Snijders and Helms (2014) show further evidence supporting the notion that research is not well-developed enough to support accurate claims about social influence effects on social media. However, Ozuem et al.'s (2021) findings should be considered

while developing strategies for communicating climate change. Their study addressed customer engagement in online brand communities using the social influence theory. The results showed that “individuals who are self-focused are more likely to be resistant to persuasion and standard norms and behave according to their central values” (Ozuem et al., 2021, p. 811). High self-focus indicates that the individual has already established one’s beliefs and attitudes about a particular subject. Thus, communicating climate change to younger individuals who have yet to establish their own beliefs and attitudes about climate-change impacts has a greater chance of success than communicating climate change to adults.

Utilizing both normative social influence and leadership/mentorship influence

When discussing social influence theory, researchers often address either normative peer influence or leadership and mentorship influence. Normative social influence is the result of an individual observing or reading written information about a descriptive norm, or “how most people behave in a given situation” (Nolan et al., 2008, p. 2), which is commonly related to peer influence. Scholars have used normative social influence to study decision-making processes of individuals’ energy conservation habits (Nolan et al., 2008), of students choosing higher education (Krezel & Krezel, 2017), of students choosing to engage in entrepreneurial behavior (Kacperczyk, 2013), of minorities choosing to pursue a scientific career path (Estrada et al., 2011), and of individuals changing their negative racial stereotypes (Tan et al., 2001).

Normative social influence results in behavioral change, as determined by two studies that analyzed the reasoning behind Californians’ energy conservation habits (Nolan et al., 2008). The first study was a survey, which showed that majority of Californians believed descriptive normative behavior had little influence on their energy conservation habits. However, the field experiment in the second study revealed that Californians were more likely to change their

behavior when given a flyer about how a majority of their neighbors practiced energy conservation than if they were given a flyer explaining the environmental and societal benefits of practicing energy conservation. This means that not only did normative social influence result in greater behavioral change, but most participants did not even realize they were being influenced by descriptive norms.

One study reported inconsistencies in normative social influence literature: Krezel and Krezel (2017) found that while normative social influence could be one of the factors contributing to a student's decision to attend higher education, more research needs to be conducted to determine the true impacts of normative social influence on higher education choices. However, this study addressed many different factors affecting higher education choices and used several theories involving social influence rather than only using Kelman's (1958). Kacperczyk (2013) determined that normative social influence impacts a student's decision to engage in entrepreneurial behavior. This determination is a result of comparing the impacts of normative social influence and institutional intervention on students' decisions to pursue entrepreneurship. The study found that normative social influence had a greater impact than institutional intervention.

Minority individuals are more likely to be successful while pursuing a scientific career path if they identify with the values of peers within the scientific community (Estrada et al., 2011). The authors came to this conclusion when they analyzed the intentions and success rate of minority students pursuing a scientific career using social influence theory. This result demonstrates the importance of normative social influence and having peers with which one can identify supporting the individual. Tan et al. (2001) studied the impact of normative social influence on racial stereotypical beliefs using social influence theories of opinion change. Their

results show that normative social influence can impact an individual's racial stereotypical beliefs, which emphasizes the importance of an individual's social environment to their attitudes and beliefs.

While normative social influence has a clear impact on individuals' decision-making processes, attitudes, and beliefs, it is also important to consider leadership and mentorship influence. Social influence theory informs leadership and mentorship influence, which includes “not only those intentional verbal efforts by a leader but also on influence dynamics that are unplanned and accidental, involve nonverbal and material activity, and occur through informal and formal role-based behaviors” (Ruben & Gigliotti, 2016, p. 1). According to Dorn (1984), social influence theory states that individuals seek counseling because they believe counselors have the resources to help them. This study uses the theory to suggest that clients will be more inclined to believe counselors when they say the clients' difficulties are manageable if the clients view the counselors as being experts, trustworthy, and socially attractive. Eesley and Wang (2017) study how different social influence sources can impact an individual's likelihood of pursuing entrepreneurship. Results showed that mentees who received an entrepreneur mentor were more likely to pursue entrepreneurship. This demonstrates the influential power of leaders and mentors who have socially valued traits. Fraser and Brown (2002) found that fans changed their lifestyle and values based on the influence of their celebrity role model, Elvis Presley. This literature has important implications for how powerful the influence of role models, leaders, and mentors is on individuals.

Leaders can have a major social influence on their followers, even in an online format, if they have the right socially valued traits and perform the right actions. Huffaker (2010) found that leaders in online media can “influence others through high communication activity,

credibility, network centrality, and the use of affective, assertive, and linguistic diversity in their online messages” (p. 593). Communication can be viewed as a way of understanding leadership that focuses on the process of social influence. Ruben and Gigliotti (2016) came to this conclusion by studying the different communication-oriented approaches to thinking about leadership and found that communication and leadership, in the simplest terms, related through their message-sending and message-receiving mechanism. This is a useful mechanism to consider while developing communication strategies.

One should also consider the impact of communication strategies using leadership and mentorship influence. Youth’s social and economic outcomes can be effectively improved by creating well-designed programs with appropriately selected mentors, role models, and media (Kearney & Levine, 2020). Youth programs combine the use of normative social influence and leadership and mentorship influence to positively affect children’s attitudes, beliefs, and behaviors regarding climate change. One factor to keep in mind is who is more likely to be influenced by leaders of these youth groups. Smith (1976) determined who is more likely to be influenced by programs such as sensitivity training by looking at the social influence theory construct, internalization. Internalizers are more likely to change from sensitivity training and accept influence because it aligns with their value system.

Therefore, leaders of youth groups are optimal candidates for communicating climate change to group members due to the already established trust regarding values. Since normative social influence and leadership and mentorship influence are found to have significant impacts on individuals’ attitudes, beliefs, and decision-making, both should be utilized in strategies for communicating climate-change impacts. Youth groups are optimal for such strategies since

members of these groups are surrounded by their trusted peers and led by a positive social influence source.

Climate-change communication through social influence theory lens

Looking at climate-change communication through a social influence theory lens can help practitioners develop more effective communication strategies using locality framing in an in-person modality. Historically, there is much literature on climate-change communication, but many gaps exist within the literature. One such gap reveals potential polarization in the source of climate-change research itself: Agin and Karlsson (2021) analyze climate-change communication research from 1993-2018 and report that most studies were quantitative content analyses of traditional news media and that there are “important insufficiencies of the search engines commonly used when carrying out literature reviews” (p. 1). Different search engines yield different journal articles results, which means scholars are not able to collect all relevant literature on their specific climate-change communication topics. This leads to conflicting studies that the public may view as not credible. Bayes et al. (2023) explains how the overwhelming scientific consensus of human-caused climate change’s existence allows for great potential effective messaging, but context and timing of this messaging is crucial and is not always achieved. Therefore, despite the overwhelming scientific consensus, media sources and the general public remain divided on climate change.

Climate-change polarization

Climate-change opinion is highly polarized, which Kysar and Salzman (2002) suggest is due to the tribalistic nature of climate change and the structure of our democracy and culture. The authors also state that scholars should focus on communicating climate change to groups who are less effected by tribalism, such as policy implementers. This concept could apply to

strategies that involve communicating to the younger generation, who is also potentially less affected by tribalism and more open-minded to new information. Bolsen and Shapiro (2018) explain how climate change has become polarized over time through U.S. news media and identify challenges communicators face while trying to bring the public to a consensus on climate change. These challenges include drawing the public's attention to climate-change issues in the face of all the other important issues and the public being highly polarized on climate change.

There are several other explanations for the polarization of climate change as well. Chinn et al. (2020) explain that the increased polarization in climate change potentially correlates with the increased use of politicians and decreased use of scientists to communicate scientific topics. The use of politicians made climate change a political issue, one on which the two major political parties are divided, increasing polarization on the subject. Hart and Nisbet (2012) used motivated reasoning, social identity, and persuasion to examine science-based messages and found that these messages actually increased polarization. The participants' reactions to the messages depended on their political affiliation. This caused a boomerang effect for Republicans, meaning that they rejected climate change more when seeing the messages. However, there is hope for decreasing polarization of environmental issues such as climate change. While conducting interviews to determine individuals' attitudes toward climate change, Mayer et al. (2022) discovered that while individuals were skeptical toward climate change due to their distrust in media and government, they had positive attitudes toward other environmental issues. The collective findings of these studies suggest that it might be wise to pull back from relying on politicians and media to communicate climate change and explore other methods.

Climate-change communication on social media

Studies are divided on the effectiveness of communicating climate change on social media, so in-person campaigns might be more effective. Diehl et al. (2019) addresses the relationship between getting news from social media and beliefs about anthropogenic climate change. Results showed that social media could reduce climate skepticism, but that individual-level and macro-level social context moderated this effect and reduced social media's potential to inform people about climate change. Falkenberg et al. (2022) determined that this polarization of climate change on social media could be due to the increase in right-wing activity.

Other studies struggled in producing evidence supporting social media's ability to reduce climate skepticism as well. Mavrodieva et al. (2019) found possible connections between social media and public perceptions of climate change by studying the use of social media as a soft power tool, but they admitted that these findings were uncertain. Pearce et al. (2019) identify several gaps in social media and climate-change research, including lack of variety of platforms, lack of qualitative studies, and lack of visual communication. Based on these studies about climate-change communication and social media, there is not enough evidence to support a social media campaign; therefore, an in-person campaign might once again be more effective in communication climate change.

Educating science teachers and opinion leaders on climate change

Science teachers and opinion leaders of all backgrounds need to be more properly informed about climate change. Plutzer and Hannah (2018) explore the possibility that science teachers are not as effective in educating students about climate change as they should be. The results showed that the content teachers include about climate change can depend on their political affiliation. This finding supports the need for careful selection of opinion leaders to

communicate climate change. Motta et al. (2021) determined that skeptical audiences, such as conservatives, were more likely to express concern about climate change when communicated by trusted sources, such as members of the military. Dekoninck and Schmuck (2022) found that offline participation in environmentally friendly behaviors increased when influencers delivered content about climate change to their followers. These studies support the claim to educate opinion leaders on climate change so they can inform their followers.

However, educating opinion leaders on climate change is not as easy as it sounds. Ratinen et al. (2013) found that student teachers' climate-change-related thinking had become clearer after attending science information sessions, but it did not make them more confident to discuss the topic. Other studies found success in educating opinion leaders. Lambert and Bleicher (2014) analyzed the effects of a climate-change education course on the climate-change knowledge and perceptions of master's students. The authors found that the students were more knowledgeable about climate change and had perceptions that were more aligned with climate scientists after taking the course. It is crucial to study the structure of these programs to understand what makes them effective or ineffective. Since youth in low socioeconomic areas are less likely to engage in behaviors that reduce climate change (Valdez et al., 2018), targeting them could yield greatest change in communication efforts.

Communicating climate change through locality framing and hands-on activities

There are several methods for approaching climate-change communication, but using locality framing and hands-on activities might be the most effective. Khadka et al. (2020) study the use of place-based approaches, or locality framing, in educating high school students about climate change. Place-based approaches in this case were effective in increasing students' understanding. Löfström et al. (2020) discuss a campaign of putting up upsetting pictures of

nature that has been affected by climate change in a local area to get people's reactions. This method triggered societal engagement, responsibility, and action potential. Born (2019) analyzes *National Geographic's* use of a polar bear as an icon for communicating climate change. The author found that the use of a polar bear as an icon for climate change led to increased "personal concern and public awareness for climate change...the icon fosters an individualized, emotionalized, and localized account of climate change but does not make its wider causes visible" (Born, 2019, p. 649). These studies support the use of locality framing in communicating climate change.

Hands-on activities should be used alongside locality framing. Asimakopoulou et al. (2021) explore the use of Earth Observation as a tool for facilitating climate-change education in schools. Satellite Remote Sensing for Earth Observation allows individuals to monitor global climate variables from space, including "atmospheric composition, meteorological variables, land use changes, deforestation and desertification processes, ice sheets, glacier movements, sea surface levels and phytoplankton growth, among others" (Asimakopoulou et al., 2021, p. 2). During these Earth Observation activities, students can interact with real data and view satellite images to observe climate impacts. The authors found that hands-on Earth Observation activities are effective in educating students on climate change in schools because it increased their interest and engagement. This study was conducted in Greece, but similar strategies could be implemented in the United States. Kumar et al. (2023) analyze The Heat-Cool Initiative, which was implemented to increase climate-change literacy in primary and secondary school children. This initiative involved hands-on activities and increased climate-change literacy by 9.4% in primary school children and 4.5% in secondary school children. Mosler and Martens (2008) found that "campaigns involving person-to-person communication are superior to mass-media

campaigns because they can be adapted to recipients' characteristics" (p. 805). The authors drew this conclusion following a campaign using computer-based simulation to analyze the impacts of various environmental messages on various audiences. These studies support the use of in-person strategies and hands-on activities in communicating climate change because hands-on activities allow students to actively participate in their own education instead of learning as a passive audience. They can observe and manipulate real-life situations regarding climate change in a creative manner, which increases interest and engagement.

Several other strategies for communicating climate change have been reported in the literature. Hawley and Mocatta (2022) use fact-based dreaming in documentary-style communication, which involves "mobilizing the creative power of imagination to subvert established thought patterns while anchoring such imagination in present-time reality" (p. 91). They find that this strategy is most effective when delivered from the perspective of children. León et al. (2021) analyze several climate-change communication strategies and discover that the common goals of these strategies are promoting environmental education and awareness, developing community, and increasing interaction. Wonneberger (2018) studied guilt arousal as a communication strategy in environmental campaigns. The author finds that guilt arousal is only effective for audiences with high concern for the environment, not for audiences with low concern. Therefore, guilt arousal would not be effective in this study's resulting communication plan.

However, other emotional appeals could be implemented in climate-change campaigns. Wong-Parodi and Feygina (2021) suggest that negative emotion can increase concern and action against climate change. This means campaigns should focus on using negative emotions other than guilt. Cramer and Foss (2009) review fatal strategies by Jean Baudrillard for environmental

communication in their critical essay. The authors argue that mixing rhetoric with magical notions of the earth-human relationship is an effective form of environmental communication. Leal Filho et al. (2018) analyze the effects of an environmental awareness camp for children in Greece for one of the case studies in their book. The findings show that the camp had positive effects on children's knowledge, attitude, and participation behavior relating to climate change. This supports communicating climate change to the younger generation using in-person communication strategies. Yang et al. (2021) look at consumers' green purchasing behavior through social influence theory and goal-framing theory. The findings show that "media, family, and peer influence (PEI) can effectively activate the consumers' goal frames" (p. 1). The studies in this section support using social influence theory to communicate climate change to youth through locality framing and hands-on activities.

Use of youth groups and activities for education

Based on my review of extant literature, communicating climate change to youth through youth groups and activities shows promise in reducing misbeliefs about climate-change impacts. In what follows, I summarize these studies as they pertain to leadership influence on youth participants' beliefs, attitudes, and behaviors, as well as the positive impacts of youth group engagement on youth's future. These methods will combine both types of social influence, namely normative social influence and leadership and mentorship influence, increasing the chance of long-lasting impacts on youth's climate-change beliefs.

Leadership influence on youth participants' beliefs, attitudes, and behaviors

Leaders of youth groups can influence the youth participants' beliefs, attitudes, and behaviors. For example, leaders of Boy Scouts of America reported to have positively influenced their members' character and self-confidence (Hershberg et al., 2015). They did so by

maintaining healthy relationships with the members and providing them with opportunities to learn new skills and gain new experiences. For similar reasons, Boys & Girls Club observed positive results following a drug-prevention program: Pierre et al. (1997) reported improvements in alcohol, marijuana, and cigarette attitudes and behaviors of high-risk adolescents. They achieved these results by incorporating youth activities and parent involvement into the drug-prevention program.

According to social influence theory, it is possible for youth groups to help youth in a variety of contexts, such as religion. O'Connor et al. (2002) and Snell (2009) separately studied the effects of religious youth groups on youth's attitudes and future involvement in church activities. Religious youth groups have mostly positive but varying effects on youth church participation. These varying effects are due to several determinants, as reported by O'Connor (2002) and Snell (2009). These determinants include denomination, youth group engagement, post-high school experiences, attending church with loved ones, adult support, church connections, and moral values. These studies also report that future youth involvement in church is increased by youth group participation and adult support. Since many individuals in the United States hold strong religious values, these findings have important implications for using youth groups to communicate and engage youth in other prominent topics such as climate change.

Engagement in youth groups and activities has also been shown to improve youth's environmental beliefs, attitudes, and behaviors. According to interviewed environmental leaders, past influences that led to their interest in environmental action include social influences, outdoor experiences, youth groups, and conferences (Arnold et al., 2009). Several case studies confirm these results. Browne et al. (2011) analyze an environmental program called Camp 2 Grow. This was a nature-based camp that immersed youth participants in experiences that ultimately lead to

environmental stewardship. Another case study addressed climate-change communication in Girl Scout programs: Puttick et al. (2015) determined that a carefully designed program, such as this one, is crucial to achieving positive changes in children's knowledge, attitudes, and behaviors regarding energy conservation and climate change.

This literature establishes the need for creating effectively designed programs lead by well-educated, positive social influences in healthy environments. By approaching already established youth groups whose members trust each other and by educating the leaders of said youth groups, these programs combine normative social influence and leadership and mentorship influence. This social influence combination will reduce climate-change misbeliefs in youth, and in turn, reduce climate-change misbeliefs overall through generational replacement.

However, one needs to consider the challenges in communicating climate change using youth groups and social influences. The social influence leaders of said youth groups need to be carefully selected to be effective in positively influencing youth's beliefs, attitudes, and behaviors. Shields et al. (2007) addresses one such challenge in their study on sportspersonship in youth sports. Poor behaviors exhibited by coaches, parents, spectators, and even teammates can negatively influence a youth player's attitudes and behaviors in sports. Another challenge includes insignificant or varying results in using adult and group influences to promote change in beliefs, attitudes, and behaviors. Evans et al. (2004) demonstrate this exception in their analysis of Statewide Youth Movement Against Tobacco Use programs. Adult involvement alone was not found to have a significant effect on youth participation, but it can be mediated by groups factors such as structure and climate. This justifies the need for both adult and peer social influences in using youth groups to positively impact beliefs, attitudes, and behaviors of important issues such as climate change.

Positive impacts of youth group engagement on youth's future

Engaging in youth groups can have positive impacts on an individual's future. Though being susceptible to social influence is often perceived as a weakness, having positive social influences, including family, peers, and leaders, is important for positive youth development (Telzer et al., 2018). Such social influences can include leaders of youth groups. Boy Scouts of America promoted good cardiovascular health to members using a merit system, which resulted in positive impacts on their cardiovascular endurance (Maxwell et al., 2017). As reported by Wieland et al. (2020), similar health promotional events have been conducted in other youth groups as well. Though measurable physical activity and dietary improvements were not found, Wieland et al. (2020) witnessed significant improvements in self-efficacy and motivation of youth to participate in physical activity following a pilot program hosted by Boys & Girls Club.

Not only can youth groups have positive impacts on youth's physical health development but also their professional and social identity development. Powell (2020) interviewed 4-H alumni and found that nearly half of the participants explained that 4-H had great influence on their career path. Youth groups can also have positive impacts on youth's environmental attitude development. A group of youth in New York were invited to participate in a 5-week environmental program. While this youth program did not improve students' place attachment, or bond to the environment, it did nurture their ecological place meaning, or symbolic association of places that define a person's identity (Kudryavtsev et al., 2012).

This program was not completely effective, which could justify the need for a system to evaluate these programs. Riemer et al. (2014) developed such a system for evaluating youth-based environmental programs. The criteria for this system include "(1) the engagement activity; (2) the engagement process; (3) initiating and sustaining factors; (4) mediators and moderators;

and (5) outcomes” (Riemer et al., 2014, p. 552). This system is useful for informing and evaluating future youth groups and programs that communicate climate change to the younger generation.

Communicating climate change to youth groups has the potential to effectively and significantly reduce misbeliefs about climate-change impacts. By approaching well-established youth groups and educating their leaders, we combine normative social influence and leadership and mentorship influence in a healthy environment to maximize the impact on youth’s climate-change-related attitudes, beliefs, and behaviors. To ensure youth’s understanding and acceptance of climate-change impacts, the literature recommends using locality framing and hands-on activities. These methods will help youth feel connected to the environment and understand how climate change severely affects their community.

In chapter 3, I consider the implications of the insights drawn in chapter 2 for the communication plan for reducing misbeliefs about climate-change impacts. I also outline the components of the communication plan, including the implementation agency, target audience, the channels of communication, key messages, and the strategies that will be implemented in the communication plan. Finally, in chapter 3 I discuss the potential effects of the proposed communication plan on individuals’ climate-change attitudes, beliefs, and behaviors.

Chapter 3: Implications for Communication Impact

As explained in chapter 1, climate change has devastating effects on the planet, but many individuals hold misbeliefs about climate change despite scientific evidence. These misbeliefs can lead to slow or anemic climate-change policies and adaptations; therefore, several scholars have explored the causes behind these misbeliefs, including misinformation, confirmation bias, and tribalism. Despite countless studies on changing public beliefs and changing beliefs specific to climate change, many people remain misinformed. Additionally, proposed solutions, which all focused on changing adult perceptions of climate change, have not yet widely correct misbeliefs. This report, therefore, explored the issue of climate-change misbeliefs from a social influence theory perspective to shed new light on the subject.

As demonstrated through review of literature presented in chapter 2, combining normative social influence and leadership and mentorship influence in a healthy and trusting environment has the potential to be effective in communicating climate change. By using locality framing and hands-on activities, the literature indicates that the audience will feel more connected to the environment and better understand the impacts of climate change. Since younger individuals were found to be more open-minded to new ideas and information, it is suggested that communicating climate change to them will produce the greatest results for reducing climate-change misbeliefs. To achieve this, the opinion leaders of younger individuals need to be properly educated on climate-change impacts.

These findings support a communication plan focusing on educating youth groups and their leaders. Youth groups are well-established and have members and leaders who trust each other. These groups provide optimal conditions for combining both types of social influence, normative and leadership and mentorship, to communicate climate change and ultimately reduce

misbeliefs about climate change. The literature revealed several implications that will inform the components of the resulting communication plan. These components include the implementation agency, target audiences, the channels through which the climate-change messages will be delivered, and the strategies used to communicate these messages. In this chapter, I address these components, starting with the implementation agency, then chart an overall path for the communication plan, which is included in the Appendix.

Implementation Agency

Due to the polarization of climate-change attitudes, it is important for members of the public to hear from sources with whom they share a social identity; K-State Research and Extension is here for just this purpose. K-State Research and Extension seeks to improve the lives of Kansans: “With scientists, educators and volunteers in each of the state’s 105 counties, our professionals strive to make the university’s research and scientific accomplishments accessible and relevant to every household” (Kansas State University, 2024, para. 1). Well-designed programs are important in improving youth’s social and economic outcomes, and recruiting the local K-State Research and Extension office can help practitioners achieve this by providing support and resources, organizing presentations for meetings, promoting events and activities, and connecting them with youth groups.

Target audiences

Based on the literature review, practitioners should target two audiences when communicating climate change: the leaders of youth groups and the members of youth groups. Targeting both audiences combines normative social influence and leadership and mentorship influence for optimal climate-change-related attitude, belief, and behavior change among youth. Youth are more responsive to new information than adults and can be greatly influenced by

trusted leaders and their social environments. For such a significant change to occur, the youth groups must have well-educated, positive leaders. Thus, the leaders of these youth groups must first be educated on climate-change impacts and practices to reduce them. Since there is a great need for climate-change education in low socioeconomic areas, where younger individuals are less likely to engage in environmentally friendly practices (Valdez et al., 2018), the communication plan will be carried out in these areas. Proposed youth groups from the literature include 4-H, Boys and Girls Club, and Boy Scouts and Girl Scouts of America.

Due to the pre-established connection between 4-H and K-State Research and Extension (KSRE), the communication plan will target 4-H leaders and members. 4-H is a national youth group program that allows youth to engage in hands-on projects related to health, science, agriculture, and civic engagement while they “receive guidance from adult mentors and are encouraged to take on proactive leadership roles” (National 4-H Council, 2024, National reach section). According to the Kansas 4-H New Family Guide, 4-H leaders are adult volunteers from the local communities (Kansas State University, 2023), but some older 4-H members also serve as camp counselors. Since 4-H is a family program, parents are also actively involved in their child’s development in 4-H. Members must be between the ages of seven and 19 years old; can be of any sexual orientation, race, ethnicity, or nationality; and can reside in towns, in the countryside, or on farms.

This plan will specifically target the 14-19 age group; however, it is possible for younger members to be involved in the proposed climate-change informational sessions and activities. 4-H strives to further the development of its youth participants, including mental, physical, moral, and social. Adults volunteer as leaders because they wish to contribute to youth development and are interested in 4-H subjects. These interest areas include natural resources, animal science,

plant science, communications and expressive arts, leadership and personal development, consumer and family science, and engineering and technology (Kansas State University, 2023). Though voluntary leaders are likely to be interested in these subjects, they do not necessarily have formal training, which reinforces the notion that these leaders need to be educated before helping practitioners communicate to the 4-H members.

The targeted 4-H groups reside in southeast Kansas counties: Montgomery, Labette, and Wilson. It is acknowledged from the research that not all leaders in these areas will be willing to communicate climate-change topics; therefore, it is important to find allies among these leaders to serve as positive social influences. Trusted and familiar faces will be crucial as mediators between the communicators and the identified public since polarization of climate change is likely in low socioeconomic areas. The channel through which the messages are delivered must, therefore, be selected carefully.

Channels

Channels of communication for the plan will include social media and educational meetings and materials. Ideally, a member of the district extension office should be involved throughout the entire process to help the leaders and members of youth groups feel more comfortable with and accepting of the new information being presented to them. Social media is not the best channel to deliver climate-change messages due to polarization of climate change on social media (Falkenberg et al., 2022) and uncertain findings and gaps in research involving social media, climate change, and social influence theory (Mavrodieva et al., 2019; Pearce et al., 2019); however, it can be used to publicize the activities and meetings taking place with the local youth groups. Other strategies will be implemented to deliver messages about climate-change impacts and reduction, including the use of educational materials and informational sessions.

Key messages

Key messages for this plan will center around climate-change impacts and methods for reducing them. Chapter 1 explained the severity and extensiveness of the impacts climate change has on the planet, humans, and organisms and significance of reducing them. Therefore, the plan will include these following messages: “Climate-change impacts are severe;” “Climate change affects human health, ecosystems, biodiversity, and Earth’s temperature;” and “We can help minimize climate-change impacts through our actions.” Since locality framing was also found to be an effective strategy for communicating climate change, the following message will also be included in the plan: “Climate change affects local communities.”

Strategies

Individuals statistically no longer trust mass media and politicians to deliver accurate science news (Mayer et al., 2022). Trusted sources are, therefore, needed to communicate this news. To educate these sources, such as youth group leaders, educational materials and informational sessions are needed. Educational materials can be available to 4-H leaders in an online, open-source format (Government of Saint Lucia, 2018). Such sessions should be led by both scientists and agents from the local K-State Research and Extension office to boost the youth group leaders’ confidence in the information distributed to them. Locality framing of climate-change impacts should be implemented in the sessions. For example, one major local impact of climate change in Kansas is its effect on a common warm-season grass known as Big Bluestem (Smith et al., 2017). The higher temperatures and drier conditions caused by climate change reduce the biomass and stature of Big Bluestem, which in turn, reduces forage for livestock and significantly impacts the ecosystem. Including information about local impacts

such as this one in the informational sessions will help connect the leaders to problem since they will understand how climate change affects their area.

These leaders can then relay their knowledge to their youth group members. Since the youth group leaders may not be confident in teaching about such a complex problem, they should partner with the scientists and agents when conducting activities with their youth groups. Previous strategies to communicate climate change to youth found success with hands-on activities (Asimakopoulou et al., 2021; Kumar et al., 2023), so similar activities should be included. This will help engage the youth group members while demonstrating the real effects of climate change. The local impacts of climate change should also be explained to the youth group members so they can feel more connected to the problem as well. One such activity demonstrating the local impacts of climate could be taking 4-H groups on a field trip to see the Big Bluestem grass and other native grasses. A subject matter expert could then attend a 4-H club meeting to demonstrate how to test the feed value of Big Bluestem to members with the help of extension agents and 4-H leaders. This activity combines hands-on activities with locality framing to increase the interest and engagement of 4-H members.

Strategies are developed based on the objectives this plan is trying to achieve, including raising awareness of climate-change impacts in 4-H members and leaders, increasing the confidence of leaders to communicate climate change, and increasing engagement of members in environmentally friendly practices. The target percentage increases in these objectives were chosen based on the fact that it is more realistic to achieve a higher percentage increase for awareness, then confidence and attitude, and lastly, behavior. Strategies for raising awareness and increasing confidence of leaders consist of distributing open-source materials vetted by KSRE and holding informational sessions. Strategies for raising awareness and increasing

engagement of members include holding informational sessions and hands-on activities at the monthly 4-H club meetings and taking field trips to recycling centers and sites for observing local impacts such as Big Bluestem. Tactics are then developed for each strategy, specifically detailing important actions to carry out strategies. Key messages were selected based on the most crucial information for the public to know about climate change. Objectives, strategies, and tactics are developed to communicate these messages. For example, visiting local sites featuring Big Bluestem will help educate members about how climate change affects local communities and visiting recycling centers will educate members about how to minimize the impact of climate change through their actions.

Expected effects of communication plan

According to the Program Director for 4-H at KSRE, there are currently no climate-change programs taking place in Kansas 4-H groups at the state level (S. Maass, personal communication, April 4, 2024). Thus, my plan fills an important gap and is a potentially powerful way for KSRE to leverage its knowledge, skills, and network for correcting climate-change misbeliefs. The combination of informational sessions, locality framing, hands-on activities, normative social influence, and leadership and mentorship influence can significantly impact youth's attitudes, beliefs, and behaviors regarding climate change and lead to a decrease in misbeliefs about climate-change impacts. It will also encourage youth to engage in more environmentally friendly practices that will help reduce the impacts of climate change.

According to social influence theory, burden of social proof, and wisdom-of-crowd effect, the gradual implementation of these strategies will lead to a larger majority consensus on the impacts of climate change. As more individuals hold factually correct opinions, more individuals will be surrounded by and influenced by factually correct opinions.

Although this plan is specifically designed for communicating climate-change impacts to 4-H youth groups in southeast Kansas counties, it can also serve as a framework for communicating other polarized but important topics to youth groups in other areas. The criteria needed to implement this plan are pre-established groups, individuals in the community with whom practitioners can connect, experts in the community or willing to travel to the community, and the inclusion of locality framing and hands-on activities. This framework can improve awareness, perceptions, and behavior regarding several scientific topics, such as vaccination and fossil fuels. The use of this framework will lead to a more scientifically literate public and a reduction in misbeliefs about subjects like climate change. It is a long game, but through such a virtuous circle of positive communication and informational effects, science communicators can influence society, and the planet, for the better.

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Appendix A - Communication Plan

Background

Climate-change impacts are severe, and misbeliefs about climate change need to be reduced to encourage policy changes and environmentally friendly practices. Communicating to youth group members and their leaders could result in the greatest change in climate-change attitudes, beliefs, and behaviors. This plan will be carried out over an 18-month period in counties in southeast Kansas.

Implementation Agency

K-State Research and Extension will play a major part in the implementation of this communication plan. They will connect experts with 4-H leaders, contact necessary parties, attend meetings, promote events and activities on social media, and distribute information.

Goals

- To reduce misbeliefs about climate-change impacts
- To encourage engagement in environmentally friendly practices

Target audiences

This plan will target two primary audiences: 4-H youth group leaders and members. It will specifically target 4-H leaders and members of the age 14-19 age group. Both audiences are crucial to the success of this plan.

- 4-H Leaders: They will be educated and serve as positive social influences to the members.
- 4-H Members: The age of 4-H members makes them more accepting of new information, and therefore, effective targets for reducing climate-change misbeliefs.

Objectives for each audience

Leaders:

- (1) To educate the leaders of 4-H groups on climate-change impacts and increase their awareness by 30% in 3 months.
- (2) To increase 4-H leaders' confidence in communicating climate change to 4-H members by 20% in 3 months.

Members:

- (1) To educate the members of 4-H groups on climate-change impacts and increase their awareness by 30% in 6 months.
- (2) To increase engagement of members of 4-H groups in environmentally friendly practices by 10% in 6 months.

Strategies for each objective

Leaders (1):

- (a) Create and provide access to open-source materials to educate 4-H leaders about climate change.

Leaders (2):

- (a) Organize meetings between 4-H leaders, K-State Extension Agents, and scientists to answer questions 4-H leaders may have about the open-source materials.

Members (1):

- (a) Organize informational sessions and activities for 4-H meetings with K-State Extension Agents, 4-H leaders, and scientists leading the sessions.

Members (2):

- (a) Demonstrate various environmentally friendly practices to 4-H members.

Tactics for each strategy

Leaders (1a):

Hire a professional to assist in developing open-source materials, including information about climate-change impacts in Kansas, educational strategies for communicating these impacts, and environmentally friendly practices.

Leaders (2a):

Create and deliver short presentations to 4-H leaders in individual or small-group face-to-face meetings on climate-change impacts. Include locality framing and hands-on activities. Answer any questions for leaders about open-source materials.

Members (1a):

4-H leaders and guest speakers create and deliver a presentation to 4-H members on climate-change impacts. Include locality framing and hands-on activities such as visiting native pastures to inform members about the impact of climate change on Big Bluestem and demonstrating how to test its feed value.

Members (2a):

4-H leaders and guest speakers teach members how to sort recycling and take them to visit recycling centers, teach members how to compost, and teach members about conserving electricity and water.

Key messages

- Climate-change impacts are severe.
- Climate change affects local communities.
- Climate change affects human health, ecosystems, biodiversity, and Earth's temperature.
- We can help minimize climate-change impacts through our actions.

Tone

Tone of messages should have an air of criticality but also positivity. Convince audiences that there is a problem, then inform them of the solutions in a positive manner.

Channels

- Informational sessions and educational materials
- Social Media: Facebook, Twitter, Instagram (For promotion of activities and meetings)

Implementation

Location:

Counties in southeast Kansas – Montgomery, Labette, Wilson

Time Frame: 18 months (January – June)

- 6 months: contacting necessary parties, preparation of educational materials, organization of meetings (January – June)
- 3 months: meeting with and educating leaders (July – September)
- 6 months: meeting with and educating members (October – March)
- 3 months: evaluation of plan (April – June)

Budget:

Kansas 4-H groups should be contacted regarding the budget. This budget was estimated based on the plans for informational sessions, educational materials, expert visits, and promotion of events and activities.

- \$5,000 - promotional materials
 - social media (Facebook, Twitter, Instagram) for informing the public about the activities 4-H members are engaging in; email, pamphlets, and posters for district office to promote use of materials to 4-H leaders
- \$20,000 - educational materials
 - open-source materials and information sheets about climate-change impacts and environmentally friendly practices – developed by a paid professional
- \$7,000 - travel expenses for guest speakers and face-to-face meetings with leaders
 - gas, car rental/maintenance, housing
- \$15,000 - hands-on activity materials (both youth group and leader meetings)
 - recycling materials, composting materials, feed value test materials
- \$3,000 – evaluation
- \$35,000 – Total

Evaluation

Evaluation should also be based on the objectives for the plan, including the change in level of awareness of climate-change impacts, change in level of confidence of leaders to communicate climate change, and change in level of engagement in environmentally friendly practices.

Pre- and post-surveys should be distributed to determine whether the objectives were achieved. They will include questions that measure awareness, confidence, and engagement of leaders and members of 4-H.

If objectives are not achieved, the program assessment should be based on Riemer et al.'s (2014) system for evaluating youth-based environmental programs. The criteria for this system include the engagement activity, the engagement process, initiating and sustaining factors, mediators and moderators, and outcomes. By looking at these criteria, the program can be adjusted for maximum effectiveness.