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Viral Headlines: An Analysis of Avian Influenza Risk Perceptions Based on News Headlines

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Viral Headlines: An Analysis of Avian Influenza Risk Perceptions Based on News Headlines

Abstract

The United States saw a rise in Avian Influenza cases between 2023 and 2024, with 70 human cases, including one death (CDC, 2025). This has received media attention due to its potential impact on public health (Shapiro et al., 2021). Perceptions of risk associated with zoonotic diseases are influenced by engagement with and reliance on the media (Nui et al., 2020). The purpose of this study was to determine how media framing of headlines related to Avian Influenza outbreaks influenced undergraduate students' risk perceptions and perceptions of the agricultural food system. A quasi-experimental design between two treatment groups was used. One group was shown media headlines reporting Avian Influenza outbreaks and responded to questions without a science communication intervention. Another group was shown the headlines and received a science communication intervention before responding to survey questions. The agenda-setting theory guided the study design and interpretation of data. Results showed that second-level agenda-setting effects were significantly greater in the group where the science intervention was completed before the survey, when compared to the group that did not receive the intervention. Results also showed a significant difference in the agricultural food system's perception scores for groups who received the intervention before the survey, compared to those who did not. Results demonstrate the importance of science communication during a zoonotic disease crisis. It is recommended that science communication interventions for real-world issues be included in the agricultural communication curriculum. Future research should explore strategies to enhance the effectiveness of science communication interventions.

Keywords

Avian Influenza, science communication, risk perception, agricultural food system, agenda-setting, agricultural literacy

Cover Page Footnote/Acknowledgements

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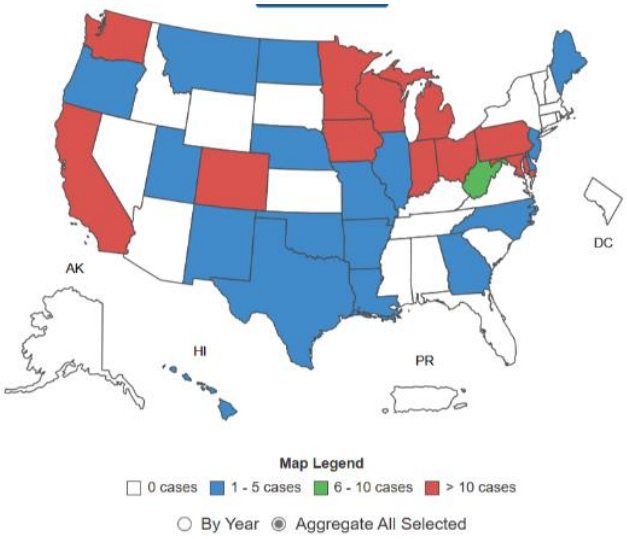
Introduction

Infectious diseases remain an important global public health concern, and changes in society, technology, and microorganisms contribute to these diseases' emergence and reemergence (Cohen, 2000; El-Sayed & Kamel, 2020; Polgreen & Polgreen, 2017). Avian Influenza, also known as “bird flu,” is a viral disease of domestic and wild birds (USDA, 2024; WHO, 2023). Like other zoonotic diseases (Ebola and salmonellosis), it has the potential to cause a global pandemic (USDA, 2024; WHO,2023). It is a major threat to poultry, animal health, trade, and the economy (USDA, 2024). Since 2022, multiple outbreaks of avian influenza have occurred across different regions, affecting both animals and humans (CDC, 2024). Between 2024 and 2025, a total of 70 human cases of Avian Influenza (H5N1), including one death, have been reported in Colorado, Michigan, Missouri, Iowa, Louisiana, Oregon, Washington, Wisconsin, California, and Texas (CDC, 2025; Figure 1). On January 17, 2025, the first case of highly pathogenic avian influenza (HPAI) was confirmed in Elbert County, Georgia, which led to the suspension of all commercial poultry activities, exhibitions, and sales (Hennebelle, 2025).

Figure 1

CDC Cases of Avian Influenza by State



CDC’s report on cases of HPAI in dairy cattle and humans highlights the significant risks posed by an Avian Influenza outbreak (Short et al., 2015). This not only endangers health but also threatens food supply and the agricultural food system, particularly for those who handle poultry and dairy cattle. The perception of risks during a zoonotic disease crisis is strongly influenced by engagement and reliance on the media, which serves as a pivotal explanatory factor in the study of social risk amplification (Niu et al., 2020). Cases of Avian Influenza outbreaks have garnered media attention, creating an opportunity for behavioral science research to explain how people think and act in response to different media messaging, and to design interventions that influence behavior for better outcomes (Joslyn et al., 2021; Naar et al., 2018; Rosenfeld & Racaniello, 2021).

Review of Literature

During a zoonotic disease crisis, individuals rely on the media for timely information that influences perceptions and decisions about health-protective measures (Garfin et al., 2020). However, the accuracy and clarity of media reporting are critical, particularly in shaping people's understanding and response to unfolding events. Previous studies suggest that willingness to follow preventive measures is strongly linked to the perceived threat of zoonotic disease (Gupta et al., 2021; Kim et al., 2020; Olagoke et al., 2020; Valeeva et al., 2011; Wang et al., 2023; Xu & Peng, 2015). Garfin et al. (2020) demonstrated how the media played a crucial role in disseminating pandemic-related information during the COVID-19 pandemic, positively impacting physical health by prompting the adoption of preventive behaviors. In contrast, Kim et al. (2020) argued that exposure to media-related information influenced strong negative emotions and increased the likelihood of adopting preventive behavior. Nonetheless, there is a gap in research when identifying effective educational and science communication strategies to reduce ambiguity and the heightened perception of threats due to media agenda-setting during a zoonotic disease outbreak (Weingart et al., 2021).

Zoonotic disease crises like the Avian Influenza H5N1 present many uncertainties, and people depend on the media, underscoring the importance of trusted sources for offering risk assessments and recommendations (Lachlan et al., 2016). Effective communication of known facts by the media helps people form accurate risk perceptions (Fischhoff et al., 2017), but ineffective communication leads to increased ambiguity and heightened perceptions of threats (Lui et al., 2016). This was evident during the H1N1 crisis of 2001 and the COVID-19 pandemic, where heightened uncertainty and feelings of uncontrollability led to increased anxiety (Kindred & Bates, 2023; Taha et al., 2014).

Different media narratives tend to be driven by personal, negative, and opinionated tones that spread (Wang et al., 2019), heighten perceived risk and fear related to public health issues (Ng et al., 2018; Wang et al., 2019). Reintjes et al. (2016) explained how the media often focus heavily on a disease during its early stages, even before much information is available. Media agenda-setting influenced risk perceptions and behaviors, and interest in influenza A H1N1 in Europe waned before the epidemic reached its peak (Reintjes et al., 2016). Zheng et al. (2020) support this view, noting how sensational headlines can negatively influence risk perception and outcomes (Zheng et al., 2020). Garfin et al. (2022) identified a relationship between media exposure and Ebola-related risk perception, fear, and worry. Similarly, Liu et al. (2021) found that information overload increased fatigue and fear of COVID-19, particularly among Generation Z in the U.K. Therefore, establishing trusted communication strategies and sharing accurate information during these times is vital for reducing the media's negative impact.

Furthermore, Luo et al. (2021) identified a generational gap in preventive behavior during the COVID-19 pandemic. Older generations, driven by a higher perceived severity, were more likely to take precautions than younger generations (Luo et al., 2021). Other studies also highlight the role of message framing and media agenda-setting on young people’s risk perceptions and behaviors during disease outbreaks (Liu et al., 2021; Tanaka et al., 2021; Zhu et al., 2023). Persuasive health messages that address the severity of disease outbreaks are recommended to reduce the generational gap and promote preventive behaviors among young people (Luo et al., 2021). Additionally, tailoring messages or presenting information to resonate with the audience's perspectives can influence risk perceptions and perceived credibility of science-based information related to the disease (Beall et al., 2021; Kahan et al., 2015).

College students tend to find news through apps, online sources, email/newsletters, and social media (Boczkowski et al., 2017; Mathews, 2022). According to Boczkowski et al. (2017), this pattern of news access, labelled “incidental news,” reflects college students' tendency to click on news sporadically and spend little time engaging with the content. This approach to news exposure and engagement makes college students prone to sensational media headlines and agenda-setting (Liu et al., 2021; Tanaka et al., 2021; Zhu et al., 2023). The investigation into the connection between undergraduate students' perceptions of risk and agenda-setting effects is motivated by a strong interest in understanding how the media sets the agenda to influence perceptions (first-level agenda-setting) and how a science communication intervention could set the agenda to improve perception and understanding of the ideal situation (second-level agenda-setting) during an Avian Influenza outbreak. This is important because there are concerns about the potential impact of media framing and presentation on individual views (Wirz et al., 2020). Luo et al. (2021) suggest developing persuasive messages to address the severity of a disease and promote preventive behaviors among young people. Developing reliable communication strategies and ensuring the dissemination of accurate information are crucial steps in managing perception and response during disease outbreaks (Sharan et al., 2023; Yang & Baker, 2024).

Theoretical Framework

This study was guided by the agenda-setting theory, which informed the study design and the interpretation of the findings. The agenda-setting theory (McCombs & Shaw, 1972) suggests that the media can influence the public's perception and attributes of issues. In this process, the media decide which issues are significant in society and shape the public agenda (McCombs & Shaw, 1972; Tahamtan et al., 2022). For example, during the COVID-19 pandemic, the widespread and repeated promotion of "social distancing" by the World Health Organization (WHO) in the media led to it being perceived as an important issue by most people (Tahamtan et al., 2022). Studies have expanded this model by exploring agenda-setting associations for different issue types, media platforms, audience characteristics, and time intervals between media coverage and audience feedback (Baker & Irani, 2014; McCombs, 2004; Wanta et al., 2004). Bradshaw et al. (2024) argued that negative media portrayals of young people may not influence behavior as intended, but negatively framed articles increased stress levels, highlighting the mental health costs of agenda-driven misinformation. Previous agenda-setting research has primarily examined how news media shape discourse and set the agenda during disease outbreaks (Baker & Irani, 2014; Tahamtan et al., 2022). This study seeks to contribute to the literature by exploring how science communication influences the salience of an issue through engagement and dialogue while addressing sensationalism and misinformation. Thereby extending understanding of the agenda-setting process and informing the development of effective communication strategies during disease outbreaks.

The conceptual framework for this study integrates 1) the framing of news headlines as first-level agenda-setting, shaping students’ agenda, and transferring salience of object or issue, 2) the science communication intervention as second-level agenda-setting, shaping students' agenda, transferring salience of attributes, thereby influencing risk perception. This provided a comprehensive lens for comparing how media framing heightened risk perception and the role of a science communication intervention in reducing perceived risk. Science communication facilitates audience engagement with societal issues, improves information processing, which enhances knowledge and perception of risk (Flemming et al., 2018; Myers et al., 2012). Several

risk communication studies also highlight the importance of science communication in enhancing risk management during outbreaks and combating misinformation (Matta, 2020; Valenti et al., 2023).

The study's main objective was to determine the role of a science communication intervention in influencing undergraduate students' risk perceptions of Avian Influenza outbreaks and perceptions of the agricultural food system after viewing conflicting media headlines. Furthermore, this study contributes to existing literature on the role of the science communication intervention as a proactive measure in educating diverse audiences during zoonotic disease threats, to improve risk perception, individuals' ability to use disease-related information to safeguard health, promote precautionary behavior, support public health efforts, and help mitigate the spread of disease. This can be pivotal for informing and optimizing community-based preventive measures, communication efforts, and strategies (Holmes et al., 2009; Majid et al., 2020).

Purpose and Objectives

This study aimed to determine how media framing of headlines related to the Avian Influenza outbreak influenced undergraduate students' risk perception and perception of the agricultural food system with and without a science communication intervention. The following objectives guided this study:

1. Compare the differences in students' risk perceptions of Avian Influenza after viewing headlines with and without a science communication intervention.
2. Compare the differences in students' perceptions of the agricultural food system after viewing headlines with and without a science communication intervention.
3. Determine the relationship between demographic factors and agricultural literacy levels among undergraduate students.
4. Determine students' preferred media source for Avian Influenza-related information.

Methods

This study employed a quantitative survey methodology with a quasi-experimental design to achieve its objectives (Mertler, 2020). Within the survey, one open-ended question related to media choice was analyzed qualitatively using Glaser's (1965) constant comparative method to identify emerging themes. This study was designed to compare two groups to determine differences based on when they received a science communication intervention (Table 1).

Table 1

Quasi-Experimental Research Design Process for Treatment Groups

Treatment Groups	Process description
Group A	Step 1: Viewed media headlines. Step 2: Answered survey questions about Avian Influenza. Step 3: Received science communication intervention. Step 4: Answered reflective survey questions specific to the science communication intervention.

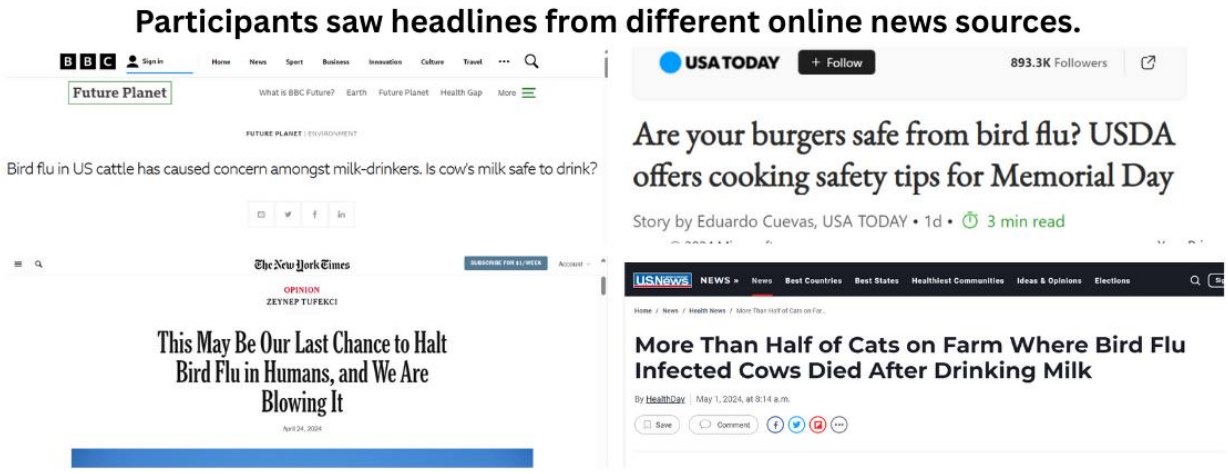
Group B	Step 1: Viewed media headlines Step 2: Received science communication intervention. Step 3: Answered survey questions about Avian Influenza. Step 4: Answered reflective survey questions specific to science communication intervention.

The Science Communication Intervention

The science communication intervention was designed to educate participants about Avian Influenza, clarify the current situation, and reduce the impact of sensationalized media headlines. This intervention was integrated into the lesson and included a presentation that provided essential information about the researchers, their affiliated organizations, and Avian Influenza (H5NI). It also addressed ethical communication by illustrating the criteria for responsible messaging through a comparison of media headlines from different news outlets (Figure 2) and communications from credible sources. The presentation covered key topics related to Avian Influenza, including its definition, the latest developments concerning the outbreak, and its implications for the agricultural food system, specifically its effects on meat, milk, and poultry production and consumption.

Figure 2

Headlines from Online News Source



Study Sample

The study's participants were selected using convenience sampling methods. In this approach, researchers selected the sample, meaning not all members of the general population had an equal chance of being included in the study (Simkus, 2023). The eligible participants were students enrolled in an oral communication class (n = 45), a leadership class (n = 60), and a business and research writing class (AEC 3033) (n = 155) at the University of Florida. This study specifically targeted undergraduate students, with a total sample of N = 260. The target population for this study consisted of undergraduate students, with an average age of 21.2 years. Participants were composed of 63.5% males, 31.5% females, and 1.9% others. The groups included Hispanic individuals (75.8%) and non-Hispanic individuals (24.2%), who identified as

White, Black or African American, Asian, and other races, with the majority identifying as White (77.3%). Academic levels ranged from Freshmen to Seniors, with a slight majority being Juniors (38.8%) and Seniors (30.0%). Most participants came from urban or suburban areas outside cities (39.6%) and subdivisions within towns or cities (38.5%).

Table 2

Demographic Characteristics of Participants

Variable	*f*	%
Gender		
Female	173	66.5
Male	82	31.5
Other	5	1.9
Ethnicity		
Hispanic/Latino(a)/Chicano(a)	63	24.2
Not Hispanic/Latino(a)/Chicano(a)	197	75.8
Race		
White	201	77.3
Black or African American	12	4.6
Asian or Pacific Islander	27	10.4
American Indian or Alaska Native	1	0.4
Multi-race	8	3.1
Other	11	4.2
Classification		
Freshman	12	4.6
Sophomore	57	21.9
Junior	101	38.8
Senior	78	30.0
Senior + (Victory lap/Grad school)	12	4.6
Location		
A farm in a rural area	10	3.8
Rural area, not a farm	25	9.6
Urban or suburban areas outside of the city limits	103	39.6
Subdivisions in a town or city	100	38.5
Downtown area in a city or town	22	8.5

Note. $N = 260$. Participants were on average 21.2 years old ($SD = 4.10$), and participants' ages did not differ by condition.

Data Collection

The study utilized an online survey for data collection. This approach facilitated easy outreach and engagement with the specific population of interest (Lamm & Lamm, 2019). Survey questions were distributed via Qualtrics and PlayPosit. Participants in Group A accessed the survey via PlayPosit, a visual learning tool on Canvas. PlayPosit allows instructors to build lessons within interactive videos, allowing students to learn while watching. This tool transforms passive video watching into an active learning experience by letting instructors embed questions, polls, and discussions directly into videos. As a result, participants were prompted to respond as they watched. Group A participants were enrolled in an asynchronous course, which prompted

the delivery of the science communication intervention and survey through PlayPosit. Group B participants accessed the survey via Qualtrics. To ensure viewing experiences on the platforms did not impact study results, faculty experts reviewed the presentations and questions, and test student responses were evaluated for consistency. The questionnaire was comprised of three sections: Section A focused on participants' demographic information, Section B focused on participants' agricultural literacy levels, knowledge, risk perceptions of Avian Influenza, perception of the agricultural food system, and press sources, and Section C included reflective questions to understand different experiences of the science communications intervention. Responses were collected using a five-point Likert-type scale. The questionnaire was derived from multiple well-established, reliable, and validated surveys, with adjustments made to tailor it to the specific population and context (National Agriculture in the Classroom, n.d.; Oliver et al., 2015; Robinson et al., 2020; Rumble et al., 2020; Settle et al., 2017; Smith et al., 2009).

Data Analysis

Data was exported from two online platforms, Qualtrics and PlayPosit, for ease and convenience of analysis by researchers, and analyzed using SPSS software 29. An exploratory factor analysis (EFA) was performed to ensure internal consistency (Cronbach's alpha > .7) of observed variables before integrating them into the construct. Research objectives one and two were analyzed through an independent sample t-test, and two questionnaire constructs were used to meet these objectives: a) risk perception of Avian Influenza, and b) perception of agricultural food systems. Risk perception was measured using four items, likelihood of high fatality, permanent physical damage, vaccine supply, medical treatment supply on a five-points Likert scale (5 = extremely likely and 1 = extremely unlikely), the four items were combined to form a reliable index (α = .80). Similarly, perception of the agricultural food system was measured using five questionnaire items, concerns with meat, milk, and chicken consumption, farm visits, and pet interaction on a five-point Likert scale (5 = extremely concerned and 1= not concerned at all). The scale demonstrated a good reliability (α = .86). To determine the effect size, which is the magnitude of difference between groups, Cohen's *d* was calculated, with .2 indicating a small effect, .5 indicating a medium effect, and .8 indicating a large effect (Cohen, 1988; Cohen, 2016).

For objective three, participants responded to six items to test their agricultural literacy level in a yes/no question. Items were re-coded as yes = 1 for correct answers and no = 2 for incorrect answers. Bivariate correlations were computed to identify the relationships between age, race, gender, location, classification, and level of agricultural importance with agricultural literacy. These correlations were interpreted using Davis' (1971) convention, with .01 to .09 indicating a negligible relationship, .10 to .29 indicating a low-level relationship, .30 to .49 indicating a moderate relationship, .50 to .69 indicating a substantial relationship, and greater than .70 indicating a very strong relationship. To identify the most preferred information source related to Avian Influenza outbreaks, participants responded to an open-ended question analyzed qualitatively using Glaser's (1965) constant comparative method to identify emerging themes. Themes were grouped based on frequency of response and percentages. Data analysis also consisted of descriptive statistics (Table 2). Objective three analysis consisted of determining relationships between demographics and major study variables (Table 4).

Results

This article is part of a larger study. Variables such as participants' risk perception of Avian Influenza, perception of the agricultural food systems, agricultural literacy, and media sources were analyzed for inclusion in this study. Results were organized by risk perception, perception of the agricultural food systems, agricultural literacy, and information sources. An independent t-test was conducted to compare how media headlines influenced risk perception and perception of the agricultural food systems with and without the science communication intervention. Bivariate correlations were used to analyze the relationship between agricultural literacy, age, gender, location, classification, ethnicity, and agricultural importance (Table 4).

Objective 1: Comparing the Differences in Students' Risk Perceptions of Avian Influenza

An independent t-test revealed a significant difference in scores for Group A ($M = 2.63$, $SD = 0.96$, $n = 154$) and Group B ($M = 2.94$, $SD = 0.90$, $n = 105$); $t(257) = -2.61$, $p = .01$(two-tailed). The magnitude of the difference in means (mean difference = -.31, 95% *CI*: -.54 to -.08) was calculated (Cohen's $d = 0.94$).

Table 3

Comparing Students' Risk Perception of Avian Influenza Outbreak Between Groups

					t(257)	*p*	Cohen's *d*
Variable	Without intervention		With intervention				
	M	*SD*	*M*	*SD*			
Risk perception	2.63	0.96	2.94	0.90	-2.61	.01	0.94
Perception of the agricultural food system	1.65	0.74	1.96	0.92	-2.85	.005	0.94

Note. Effect size Cohen's *d*: .2 = small effect, .5 = medium effect, .8 = large effect (Cohen, 1988; Cohen, 2016). Scale ranged from 1 (extremely unlikely) to 5 (extremely likely).

Objective 2: Comparing the Differences in Students' Perceptions of the Agricultural Food System

To compare the agricultural food systems perception scores for Groups A and B, an independent sample t-test was conducted (Table 3). There was a significant difference in scores for Group A ($M = 1.65$, $SD = 0.74$, $n = 154$) and Group B ($M = 1.96$, $SD = 0.92$, $n = 105$); $t(257) = -2.85$, $p = .005$ (two-tailed). The magnitude of the difference in means (Mean difference = -.31, 95% *CI*: -.53 to -.10) was calculated (Cohen's $d = 0.82$).

Objective 3: Relationship Between Demographic Factors and Agricultural Literacy Levels

Bivariate correlation was calculated to identify the relationships between the dependent variable, agricultural literacy, and the independent variables age, ethnicity, gender, location,

classification, and level of agricultural importance. Results showed there was a low positive relationship between agricultural literacy and ethnicity (r = .12, n = 259, p = .02), a low positive relationship between agricultural literacy and participants' level of agricultural importance (r = .18, n = 259, p = .002), and a low negative relationship between agricultural literacy and location (r = -.15, n = 259, p = .008). The relationship between agricultural literacy, age, classification, and gender was not statistically significant.

Table 4

Correlations for Study Variables

Variable	1	2	3	4	5	6	7	8	9
Agricultural Literacy	1								
Age	.095	1							
Ethnicity	.121*	0.79	1						
Gender	-.019	.166**	.113**	1					
Location	-.151**	-.101	-.049	-.011	1				
Classification	-.008	.364**	-.013	.058	.032	1			
Agricultural Importance	.179**	.203**	-.008	-.066	-.108*	.104*	1		
Risk Perception	-.075	-.059	.088	-.066	-.010	-.043	-.066	1	
Perception of the agricultural food system	-.091	-.121*	-.086	-.109*	.010	-.096	.023	.252*	1

**p ≤ .001, *p ≤ 0.05. Note. Strength of relationships (Davis, 1971): .01 – .09 = Negligible, .10 – .29 = Low, .30 – .49 = Moderate, .50 – .69 = Substantial, > .70 = Very strong.

Students' Preferred Media Source for Avian Influenza-related Information

Participants identified their preferred media source for Avian Influenza-related information. Nine themes emerged, with the largest number of participants saying they preferred government agencies (f = 195, 44.4%). This was followed by news outlets (f = 110, 25.0%) and journals/research (f = 38, 8.7%). Social media (f = 8, 1.8%) was the least preferred source identified by participants, with 30 (f = 30, 6.8%) not indicating their preferred sources.

Table 5

Most Preferred Source for Avian Influenza-Related Information (n = 439)

Source Category	Response examples	*f*	%
Government agencies	CDC, CDC websites, CDC newsroom, FDA, WHO, USDA, AFBF, FDC, HHS, NIH, Government agencies, EPA, American Farm Bureau, US Bureau of Agricultural Research, Department of Health, Department of Agriculture, and Consumer Services	195	44.4

Source Category	Response examples	*f*	%
News outlets	CNN, BBC, Fox News, New York Times, NBC, ABC, NPR, AP, PBS, REUTERS, Washington Post, CBC, CBS, MSNBC, Truth Social, Tucker Carlson Network, APPLE News, CNBC, Rutgers News, Dailywire, National Geographic, local news services, other news outlets, news, US news, none biased media outlets, ground news, accredited news stations, local farmer radio station	110	25.1
University/College sources	College and university media sources, colleges, universities, and Extension documents	19	4.3
Journal/Research	Credible articles, journals, articles, scientific articles, medical institution publishing, PubMed, independent research, university research, university articles, papers published by doctors, medical journals, Wall Street journals, research articles, university/extension research papers, academic journals	38	8.7
Social media	Social media, TikTok, Twitter, Instagram	8	1.8
Science/Agricultural sources	Information written by producers of pastured poultry, science/agriculture, science and agriculture, farm/agricultural experts, scientist friends, farmers, scientists, non-profits led by scientists or farmers, agricultural agencies, agricultural sources, agricultural-related outlets, science-based media, science organization sites, science daily, doctors, local doctors	15	3.4
Government sources	Government website, government press release, government bulletin, government-related, White House Press, government resources	9	2.1
Others	Independent alternative media sources, non-governmental organizations, I will seek new sources that are not opinion-heavy, non-clickbait titles, databases, a mix of sources, reputable sources, politically neutral sources, a wide variety of sources, amp; prevention, professional health organizations, local health department, videos, Google search	15	3.4
None/Uncertain	None, not sure, N/A, uncertain, I honestly don't know, I don't know, I am not sure, unsure, none comes to mind	30	6.8

Discussion, Conclusions, and Recommendations

The current study provides new insights into the role of science communication interventions in setting the agenda for zoonotic disease and alleviating the effects of negatively framed media headlines. Findings are interpreted using the agenda-setting theory, which suggests that media coverage of topics influences perceptions (McCombs & Valenzuela, 2020). Previous research indicated how media framing negatively impacts risk perception (Zheng et al., 2020). This study revealed a significant difference in risk perception scores between groups (Table 3). There was a lower risk perception of Avian Influenza for the group without the intervention

(Group A). However, it should be noted that the mean differences were within the same level of risk perception, which could be due to unequal sample sizes between groups.

Agenda-setting effects were noticed in group B, where the science intervention effectively influenced risk perception by making the attributes of Avian Influenza salient in the minds of respondents as an issue on their agenda when compared to group A, which did not receive the intervention and placed less importance on the issue, and the negatively framed headlines. This confirms previous findings that training can impact knowledge and perception of zoonotic disease (Hoang & Anh, 2024). The mean score of Group B ($M = 2.94$, $n = 105$) indicated a better assessment of the likelihood of risk associated with the Avian Influenza outbreak when compared to Group A ($M = 2.63$, $n = 154$), which only viewed the negatively framed headlines without the science communications intervention (Table 3). Previous literature revealed how media reporting contributes to levels of uncertainty during a disease outbreak (Park et al., 2020), making it difficult to assess the likelihood of risk associated with the disease, as evidenced in group A.

This study also revealed a significant difference in the agricultural food system perception score for groups A ($M = 1.65$, $n = 154$) and B ($M = 1.96$, $n = 105$). The mean score for both groups indicates participants in both groups had less concern toward the agricultural food system (see Table 3). The media headlines did not have a negative influence on students' perceptions of the agricultural food system, and students did not have concerns about meat, milk, and poultry consumption, farm visits, or pet interaction. This is contrary to previous findings, which suggest that media representation of agricultural topics and issues influences perceptions of the agricultural food system (Howard et al., 2017; Specht et al., 2014). While the group with the intervention was slightly concerned when compared to the group without the intervention, which could be due to the agenda-setting effect of the science communication intervention making attributes of Avian Influenza more noticeable, other factors may have contributed to this (Commoradi, 2017). Future research should consider investigating the factors impacting the effectiveness of science communication interventions in a similar context.

In addition, this study identified a statistically significant but weak relationship between ethnicity, agricultural importance, location, and agricultural literacy (Table 4). Results indicated that participants who perceived agriculture as important to them were more knowledgeable when compared to participants who placed less value on agriculture. Also, a low negative relationship between agricultural literacy and location suggested participants who lived on farms or in rural areas had higher agricultural literacy levels when compared to those who lived in urban areas and cities. These factors may have influenced understanding and value placed on the issue, therefore influencing risk perception and perception of the agricultural food system. Previous studies revealed how knowledge and literacy significantly influenced the assessment of potential risks and improved the perception of agricultural concepts (Cosby et al., 2022; Lemley et al., 2024). Future research should explore the relationships between agricultural literacy and risk perception in the context of a disease outbreak. Studies should also investigate how this can impact the effectiveness of science communication interventions.

Furthermore, this study also revealed students' preferred media sources for Avian influenza-related information during outbreaks (Table 5). The most preferred source of information students identified to learn about Avian Influenza was government agencies ($f = 195$, 44.4%), with the CDC, identified as the most recurring ($f = 91$, 47%) within this theme, followed by WHO ($f = 35$, 18%) and USDA ($f = 35$, 18%), other government agencies identified were FDA, NIH, AFBF, US Bureau of Agricultural Research, EPA and American Farm Bureau. This

confirms findings from Baker et al. (2022), which revealed that the U.S. public actively sought information from national and international organizations during disease outbreaks. This presents an opportunity for the CDC, WHO, USDA, and other government agencies, as well as public health agencies, to provide educational materials such as infographics and videos, including campaigns to inform the public about outbreaks, associated risks, and preventive measures. While previous research found social media as the most preferred source of information during the COVID-19 pandemic (Yuksel et al., 2020), this study revealed the contrary. Social media was identified as the least preferred source of information for Avian Influenza (Table 5). This is consistent with previous findings, which suggested Facebook and Twitter contributed to varying patterns of mistrust (Unlu et al., 2023). Further research should focus on analyzing media content to identify how specific themes, message framing, context, and platforms might influence risk perception and prevent misinformation during an outbreak.

Lastly, the findings of this study support Baker et al. (2020) recommendation for future research to focus on identifying effective educational and communication strategies to facilitate connections among diverse audience groups. The current study accents the complex relationship between media exposure, risk perception, and the role of a science communication intervention. Researchers recommend a science communication intervention as a preventive measure to communicate with diverse audiences during a zoonotic disease outbreak. While the science communication intervention significantly influenced students' risk perception, there is a need for strategies to enhance the effectiveness of science communication interventions to mitigate the impact of media sensationalism, particularly in young audiences. It is essential to note that the findings of this study are limited by the sample size, which may limit the generalizability of findings, and unequal sample sizes in the treatment groups may result in biased estimates of population parameters such as means. Studies can be replicated with a larger and more diverse sample to enhance generalizability. Researchers could also explore longitudinal studies to examine the long-term effects of the science communication intervention and their impact on different populations.

Recommendation for Practice

The study revealed the importance of a scientific communication intervention as a tool that influences knowledge and perception during a public health crisis. Based on the findings, science communication interventions can be an important tool in public awareness campaigns and workshops to improve general science literacy and enhance perceptions during disease outbreaks. Since participants preferred information from sources like the CDC, USDA, and WHO, these organizations should take a more active role in communicating with the public during disease outbreaks by utilizing tools like infographics and videos on different platforms.

Timeliness is a critical factor for effective science communication interventions. Science communication interventions should be implemented at a time when the public is forming opinions about disease attributes. The science communication intervention highlighted the attributes of Avian Influenza within the intervention group. However, the group without the science communication intervention placed less importance on the issue. This may have been due to a lack of understanding about the relevance of the issue to them, resulting from poor agricultural literacy levels. Thus, timely science communication interventions can facilitate individual opinion about a disease by providing accurate and reliable information, bridging

knowledge gaps about the disease, and addressing misinformation. Furthermore, this can be utilized to reduce ambiguity caused by media reporting during zoonotic outbreaks.

Designing a Science Communication Intervention

The results of this study also highlight the importance of considering different audience groups and their specific needs when designing science communication interventions. When designing a communication intervention, it is important to reflect on factors such as age distribution, classification, ethnicity, race, gender, location, and the importance placed on the issue. When designing for an audience who perceives the issue as less important to them, it is important to consider message framing and design. While it is important to provide factual scientific information, it is equally important to avoid overwhelming the audience with too much information. Consider developing interactive designs that allow the audience to engage with the interventions, incorporating visuals, interactive elements, and animations that appeal to the audience's needs, interests, values, and goals. Science communication interventions could be designed as short, engaging videos that summarize key messages like an elevator pitch. Ensure the science communication interventions end with a clear call to action. Overall, agricultural communicators can leverage science communication interventions to connect with diverse audience groups, enhancing communicative actions, promoting dialogue and understanding about shared issues, while bridging the gap in scientific knowledge. Moreover, public health organizations can utilize this as a tool to inform future health communication processes.

Recommendations for Theory

The study utilized the agenda-setting theory to understand how media headlines set the agenda for discourse among undergraduate students, serving as first-level agenda-setting, and how the science communication intervention set the agenda by making the attributes of the Avian Influenza outbreak salient among undergraduate students. Results indicated that the science communication intervention had a significant influence on risk perception and perception of the agricultural food system. However, scores were within the same range. Future research should investigate how other factors could impact objects and attribute agenda-setting effects when transferring salience.

Recommendations for Teaching

Communication courses in agricultural and life sciences should incorporate science communication into lessons and focus on teaching science communication using real-world scenarios. In this current study, researchers used a science communication intervention to teach students about ethical communication in the context of an Avian Influenza outbreak. This will help improve understanding of complex agricultural issues and enhance agricultural literacy. This can also facilitate dialogue and encourage students to share their views and opinions on agricultural issues and concepts. Students should be challenged to design clear communication messages that simplify complex agricultural topics and engage the audience. Students should also be taught the importance of message framing in shaping public trust and engage in analyzing why some communication messaging works and others do not. Science communication interventions can also be applied to intercultural communication courses within

the agricultural education and communication department to examine differences in social context. Students can be engaged in designing clear messages and videos suitable for audiences and agricultural issues specific to diverse cultures. This can also be used to assess the relevance and effectiveness of science communication across different cultural dimensions.

Recommendations for Research

This study was limited to undergraduate students enrolled in specific courses at the University of Florida. Future research should consider replicating the study using different population samples and sampling strategies to improve the representativeness of the sample and increase generalizability. Unequal sample sizes in the treatment groups may have resulted in biased estimates of population parameters, such as means. Studies can be replicated with a larger and more diverse sample to enhance generalizability. Researchers could also explore longitudinal studies to examine the long-term effects of the science communication intervention and its impact on different populations.

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