

Pro-Social Behaviors and Social Media Usage During the COVID-19 Pandemic

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Abstract

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This study will examine the association between sources of social media exposure and adherence to pro-social behavior in the context of the United States (e.g., mask-wearing, attitudes towards vaccination, and uptake of vaccination) through a population-representative sample of the United States over three time periods (i.e. a longitudinal survey collected over the course of the COVID-19 pandemic). The methods for this study consisted of using survey weights and generalized linear models (GLM) to examine willingness to get vaccinated for COVID-19 and mask-wearing practices. Findings provide insight into the potential impact of different social media sources on pro-social behaviors during the COVID-19 pandemic, highlighting the importance of understanding how sources of social media exposure can influence health behaviors.

1. Introduction

In January 2020 Sars-COV-2 (COVID-19) changed the world irrevocably. A major development in health information dissemination by healthcare professionals, politicians, and the general public via social media. Social media has increasingly shaped the social and health behaviors of the public during the COVID-19 pandemic (Freiling et al., 2021). The practice of health-preventive measures was recommended early on by the Centers for Disease Control (CDC) to reduce the risk of contracting or spreading COVID-19 (CDC, 2021; Chang et al., 2021); however, despite the risks, there have been individual differences in how people adhere to these measures. There is a need to develop behavioral strategies that can effectively increase public adherence to these guidelines, especially for young adults, who report particularly low adherence (Graupensperger et al., 2021; Park et al., 2020; Wang et al., 2020). Consistency in pro-social behavior remains a challenge, yet these measures, including social distancing, wearing masks, and social distancing, have been found to be effective (Chu et al., 2020; Mongey et al., 2020, Lin et al., 2021). The United States continues to record 129,000 new COVID-19 cases per day, mostly driven by the highly contagious Omicron subvariant BA.5 (NYT, Census Bureau. 2022).

The COVID-19 pandemic intensified social media engagement to another level, as people shared the news with each other (Freiling et al., 2021; Krause et al., 2020; Obiala et al., 2021). This is particularly alarming as the failure to comply with health preventative measures can result in the uncontrollable spread of the coronavirus and a high number of fatalities attributed to the disease (Van Green et al., 2020; Goldstein D & Wiedemann, J. 2020; Neureiter et al., 2021; Graupensperger et al., 2021). In a recent national survey, over one-third of the U.S. population reports using Facebook to obtain news (Newman et al., 2020), so it is no surprise that social media platforms such as Facebook have become popular news outlets for COVID-19

information (Shearer and Mitchell, 2021). Lin et al. (2020) found an extensive amount of COVID-19 information facilitated by mass and social media was associated with the public's perception of susceptibility and severity regarding COVID-19 infections. This also contributed to their subsequent engagement in preventative health behaviors against contracting COVID-19. In addition, U.S. conservative politicians and the media downplayed the risk of both contracting the coronavirus and the effectiveness of recommended CDC measures during the initial phase of the COVID-19 pandemic (Freiling, et al., 2021). There is a substantial amount of research studies that have found an association between political orientation and perception of health risk associated with COVID-19, as well as adherence to pro-social behavior in the U.S. (Stroebe et al., 2021).

Extensive research has examined which online sources people use to obtain news on COVID-19 (Merchant et al., 2021), however, our understanding of how these sources impact individuals' behaviors, particularly in the context of pro-social behavior during the pandemic, remains limited. Nonetheless, recent research has aimed to address this research gap (Li & Liu., 2020). Recent studies have shown that an extensive amount of information available on social media played a significant role in shaping the public's perception of COVID-19 infections and their subsequent engagement in preventative behaviors (Lin et al., 2020).

Emerging and reemerging disease outbreaks mean future pandemics will happen more often. Numerous studies (Leal-Filho et al., 2020; Ashbolt, 2019; Zhao et al., 2019; Franklinos et al., 2019) have demonstrated that climate change has been linked as a contributing factor to unpredictable weather events (e.g., heavy rainfall, flooding, wind patterns, intense heat, and cold temperatures) that are associated with the transmission of diseases (water-borne, vector-borne, and respiratory and autoimmune). Confusion and contradictory information from fake news and information overload will further constrain global efforts to contain future disease outbreaks (Mian & Khan, 2020; Hashimoto et al., 2021). A wide range of COVID-19

content is found on social media sources. Some content downplays nearly every aspect of the pandemic including the origins of the virus, current treatments, and vaccine safety. Other content may instead convey danger and fear (Allington, et al., 2022). It is an ongoing challenge to mitigate the health and behavioral harms of such content because of the sheer volume of information being distributed. Because social media sources contain different types of content, including misinformation, that is sometimes not labeled, trying to distinguish it from credible sources can be increasingly challenging, particularly when highly politicized and opposing views are categorized as fake news (Calo et al., 2022; Freiling et al., 2021; Merchant et al., 2021). As a result, the effect of social media exposure on health-preventative behavior may depend on the content of the media to which a person is exposed. As an example, the origins of the coronavirus, which has been widely discussed in the media, have gathered significant attention (Allington, et al., 2022).

This study will examine the association between sources of social media exposure and adherence to pro-social behavior in the context of the United States (e.g., mask wearing, attitudes towards vaccination, and uptake of vaccination) through a population-representative sample of the United States over three time periods (i.e. a longitudinal survey collected over the course of the COVID-19 pandemic).

2. Conceptual Framework

2.1. Social media and health-preventative behaviors

Americans increasingly rely on social media platforms for news. About half of U.S. adults say they obtain news from social media (Shearer and Mitchell, 2021). Research has generally suggested that social media use tends to focus on entertainment (Johnson & Kaye, 2015), but there is ample evidence that people also use it for news consumption. This is further exacerbated through the known mechanism of peer trust (Johnson & Kaye, 2015; Johnson &

Kaye, 2014), i.e. people tend to believe news shared from their personal network at higher levels than typical news viewing such as television. Social media has served as powerful mechanisms for public engagement and are considered vital for public health preparedness, response, and recovery (Merchant et al., 2021; Sylvia Chou et al., 2020). For example, (Li & Liu., 2020) conducted a study during the pandemic and suggested that, as “people used social media more frequently and spent more of their time on social media, they were likely exposed to more COVID-19 news which was positively related to their preventive behaviors.” Research has provided compelling evidence to suggest there is more than a bivariate association between social media and prosocial behaviors. In this work, I am going to propose a comprehensive model (see Fig 1) encompassing various significant variables that could potentially influence pro-social behavior. These selected factors contribute to the overall understanding of the complex interplay between social media and pro-social behavior.

2.2. Altruism & the role of social responsibility

The literature on health preventative behaviors during the COVID-19 pandemic proposes an association between the sources of social media exposure and pro-social behaviors. One of the main frameworks is altruism (i.e., any behavior that is intended to improve another person’s well-being), particularly those actions that do not seem to provide a direct interest to the person who performs them; Batson, Ahmad & Stocks, 2011; Dovidio, Piliavin, Schroeder, & Penner, 2006; Penner, Dovidio, Piliavin, & Schroeder, 2005). Some of these behaviors are described as intuitive (Zaki & Mitchell, 2013), such as everyday acts of helping that occur around society. Some of these behaviors may represent true altruism, while others might represent helping that is motivated by more self-concern. In addition, there are also occurrences when individuals do not help at all – seeming to not care about the needs of others.

A relevant framework we will consider is the Social Responsibility Norm (SRN). The Social Responsibility Norm describes the sense of duty or obligation to contribute to the greater good

and to help those needing help – a personal value that reveals itself in our beliefs and the way we interact with others (Berman, 1997; Galloway, 2006; Kohlberg & Candee, 1984). Social responsibility conceptually overlaps with a variety of constructs such as altruism, empathy, and pro-social values and behaviors (Wray-Lake., & Syvertsen, A. 2011). Responsibility implies feeling accountable for one's decisions and actions within their control. Social responsibility is expected to encourage individuals' behaviors that involve helping others and contributing to society. Such responsibility has been positively associated with pro-environmental behaviors (Verplanken & Holland, 2002), and political activism (Mayton & Furnham, 1994). In the context of the COVID-19 pandemic, adherence to pro-social behaviors (e.g., mask wearing, social distancing, and hand washing) are examples of social responsibility – as it reflects the overt cooperation of society.

These various cognitive behaviors are expected to play out in people's choices among prosocial and antisocial behavior. Due to the limited information on the coronavirus in the early stages of the pandemic, people failed to realize their own behaviors played a significant role in mitigating the spread of COVID-19. Health campaigns and the hashtag #MaskUp further encouraged people to actively wear masks and offered advice from health leaders to keep themselves, their families, and their communities safe. Thus, social responsibility may be an important determinant of whether people choose to adhere to pro-social behaviors or not. The beliefs and attitudes about social responsibility may be shaped by one's exposure to social media – which in turn influences peoples' likelihood to adhere to health-preventative measures (e.g., mask wear and uptake of vaccination).

The Cultivation theory (Gerbner and Gross, 1976), suggests that people exposed to media interpret social realities according to how such realities are portrayed in the media. Media can reinforce a person's preconceived beliefs and attitudes, and gradually create a distorted view of reality – which can then create a barrier between people engaging in discourse with others with

different beliefs. However, it is important to note that the effects of media are limited (Gerbner et al., 1976). Instead, Gerber and Gross argue the accumulation of media exposure effects in a specific direction is considered more critical than the effect of a certain program at a particular point in time (Gerbner, Gross, Morgan & Signorielli, 1980). While the primary focus was centered on the role of television, this theory has been increasingly applied to social media contexts (e.g., Intravia et al., 2017; Tang et al., 2021; Tsay-Vogel et al., 2018; Wei et al., 2020; Liu, 2021), as well as describing how media exposure may influence people's understanding of a disease – therefore shaping their health behaviors (Li et al., 2019; Wei et al., 2020).

Social media allows people to engage with their interest groups, thus enabling them to solidify social responsibility. Within social media, social responsibility entails developing a positive relationship with the society in which people operate. For organizations, companies, or corporations this often involves being actively involved in social, cultural, economic, and environmental issues. For example, local health organizations on social media may demonstrate social responsibility by providing educational information on COVID-19 health protocols. Because social media is customizable to the individual's preferred source consumption of news and information, different social media sources may foster different attitudes toward social responsibility. Cultivation theory not only offers an explanation as to how social media users establish a belief of social responsibility in combating COVID-19 but also accounts for the subsequent behavioral effects such as the engagement of health-preventive practices (Stein et al., 2019). These two theories, if combined, can offer complementary perspectives to explain pro-social behavior that is both specific to the COVID-19 pandemic.

2.3. The role of political orientation

Americans tend to rely on different sources of information, which prioritize different values. With COVID-19, we are seeing polarized attitudes emerging along partisan lines (Scheufele et al., 2020). Perceptions of the credibility of these sources also differ as a function of

political orientation (Stroebe et al., 2021; Pew Research Center., 2020). The credibility of a source can be an important determinant of the impact of communication (Stroebe et al., 2021). If a person believes their vulnerability to a health threat is relatively low, they would be less motivated to likely accept information from a source they consider credible (Stroebe et al., 2021). A central question is whether peoples' willingness to adhere to pro-social behaviors may have been shaped by political concerns (Stroebe et al., 2021). Furthermore, people would be expected to adhere to the recommended health guidelines to prevent the spread of COVID-19 to the extent to which they believe they can become infected and whether they consider the disease to be a serious health threat.

Studies have shown that people who identify as conservatives generally show a mistrust of expert-driven and science-based policies (McCright and Dunlap 2011; Bolsen and Druckman 2018). In addition, studies also have shown how such mistrust has contributed to behavioral outcomes, such as the reduction of vaccine rates among conservatives (Suryadevera et al. 2019; Long et al., 2020). At its core, conservatism espouses a small-government philosophy (Goldstein et al., 2020). In the COVID-19 context, policies put in place to mitigate the spread of the coronavirus have been mostly driven by scientific experts as well as professionals at the CDC. Such policies might represent another tactic to curtail individual liberties.

For example, people who identify as liberals may be exposed to a wide range of social media content that further promotes pro-social behaviors (e.g., mask wearing and uptake of vaccination) and exposure to this information may activate a strong sense of social responsibility to help create a collective outcome. Whereas conservatives may be exposed to different social media content – ideas that may prioritize one's freedom of choice. This exposure to information about social responsibility will be activated, however, are different attitudes toward social responsibility. Johnson and Kyle (2015) showed that people using social media

often judge credibility based on personal and emotional cues. When it comes to political information, users are more likely to see it as trustworthy if it comes from a friend they trust or matches their own beliefs. The beliefs and attitudes of social responsibility may be an important mechanism that is triggered by this exposure to social media. Because both groups are exposed to different social media, it is different ideas about the social responsibility that are activated, therefore, creating different impacts on their likelihood of adhering to pro-social behavior. This effect is dependent on a person's political orientation because it influences the kind of social media they are exposed to. Hence, we hypothesize that political orientation is a significant driver of differential adherence to prosocial behaviors amidst the COVID-19 pandemic. Government trust and demographic variables are also included in the framework as they may contribute to the overall understanding of the interplay between social media and pro-social behavior.

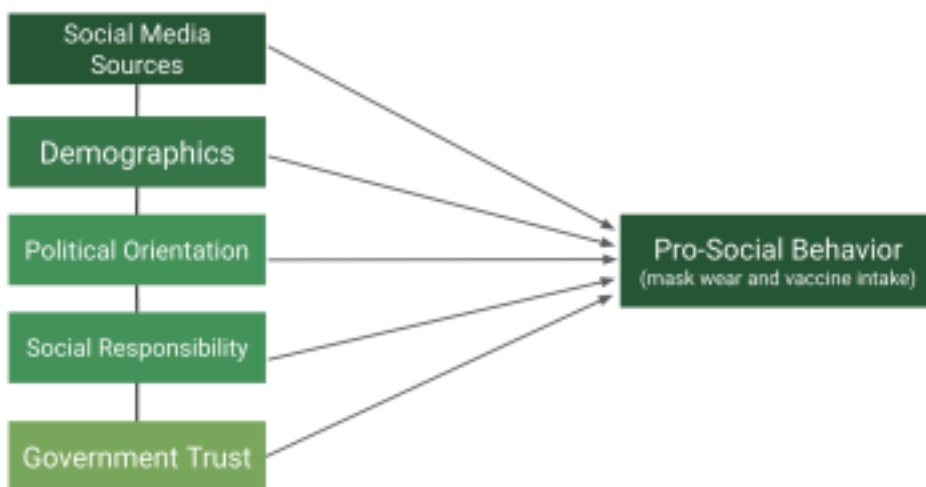


Figure 1: Conceptual Diagram

3. Hypotheses

Drawing on the theoretical frameworks discussed thus far, it is apparent that the interplay

between attitudes toward social responsibility and exposure to different social media sources can influence the likelihood of individuals adhering to pro-social behavior. In this section, we present the following hypotheses:

H.1. A positive association between sources of social media exposure and adherence to pro-social behavior.

H.2. A positive association between social responsibility and adherence to pro-social behavior.

H.3. Sources of social media exposure increase the likelihood of adhering to pro-social behavior if a person is liberal.

H.4. Sources of social media exposure reduce the likelihood of adhering to prosocial behaviors if a person is conservative.

Having established hypotheses about the potential relationships between sources of social media exposure, social responsibility, political orientation, and pro-social behavior, the next section will explain the methods that will be used in this study.

4. Methods: Data Methods

Data

Here, we will use the data from the *NSF sponsored Behavioral Change COVID-19 (BCC19) Survey*. This study examined the opinions of the U.S. population regarding COVID-19 and health-preventative behaviors (e.g., social distancing, mask-wearing, washing hands, etc) longitudinally over the course of the pandemic. The survey was fielded in three waves between September 2020 and June 2021. The survey is a representative sample of US residents over the age of 18 with around 1,400 individuals in the first wave, around 1200 individuals in the second

wave, and around 1,000 individuals in the third wave.

Social Media Metrics

To measure social media and respondents' preference selection of social media sources for obtaining COVID-19 information, we examined specific questions from the survey. Firstly, we used the question: *In the last 24 hours, which of the following did you get any news or information from related to the COVID-19 pandemic (Check all that apply)*. This question serves to identify the sample of respondents who reported using social media as a source of information. Subsequently, the survey includes the following question, which was used in our generalized regression models (GLM) with survey weights: *In the last 24 hours, did you get any news or information related to the COVID-19 pandemic from any of the following online sources? (Check all that apply)*. Each social media platform was treated as an independent variable, categorized as binary (coded 1/0). This approach allowed for the identification of each social media source through which respondents obtained COVID-19 information and provided a 24-hour timeframe for this information to be retrieved. However, it is important to note that information regarding the frequency and total duration of usage for each social media source was not collected. Moving forward, the interpretation of the findings should be approached with caution.

Given that respondents had the option to select multiple sources, it is understood that there could be overlapping choices among the sources. To address this potential overlap, we categorized the sources into three distinct groups: social media (e.g., Facebook, Twitter, Reddit), government online sources (e.g., health institutions), and traditional TV broadcasting (e.g., CNN, MSNBC, FoxNews). The purpose of this categorization was primarily for descriptive purposes. Through this categorization, we could examine whether disparities existed when respondents utilized at least one social media source.

GLM with Survey Weights

In this paper, we will focus on the use of masks (coded 1/0) and vaccination status (coded 1/0), which will allow us to use logistic regression to understand the phenomena of interest since we have a population-representative sample of mask usage and vaccine status from our survey. Specifically, the dependent variables, vaccine willingness, and mask-wear were determined based on responses to the following: (1) frequency of indoor mask-wearing in public spaces over the preceding week, and (2) willingness to get a COVID-19 vaccination once available, respectively. Social responsibility was applied as individuals' pro-social behavior to be important to the health and safety of one's community as opposed to disregarding its importance. The variable political orientation was classified as either conservative or liberal. In addition to political orientation, we included a trust in government variable as a binary factor in the analysis. And lastly, we incorporated demographics, specifically gender, age, and race & ethnicity, into the GLM models. Respondents were asked to indicate all sources of information they had used in the past 24 hours to obtain news on COVID-19. This feature of the data set is noteworthy because it may offer a more precise reflection of the actual sources used by respondents, relative to a general inquiry into their source preferences. In addition, the time frame of 24 hours further enriches the data.

Because the data comes from a complex survey design with weights we will use a form of logistic regression that takes into account the inclusion weights of the survey. We do this using the "survey" package in R.

5. Survey Descriptives

In this section we will review the key descriptive statistics that inform our regression models. In the first Table, we will explore the proportion of participants who expressed their willingness to receive vaccination for COVID-19 and the proportion of individuals who reported wearing

masks in indoor spaces during the preceding week, respectively. We can further stratify these tables by the usage of online sources for acquiring information related to COVID-19. For the purpose of this study, social media usage is operationally defined as respondents who reported using at least one form of social media within the 24-hour time frame to obtain news or information related to COVID-19. It should be noted that respondents who did not engage with social media at all were not included in the subset analyzed, as the question was exclusively available to those who had previously indicated using social media to obtain information about COVID-19 in the past 24 hours. This approach aligns with the structure of the question posed to respondents, using a 'check all that apply' format to capture their social media usage preferences.

In general, individuals in Table 1 who identify as liberals have a greater willingness to receive the COVID-19 vaccine than their conservative counterparts. This contrast is especially noticeable among female conservatives when contrasted with male liberals. Approximately 35% of females who identify as conservatives reported using social media sources compared to 63% of females who identify as liberals. Female conservatives who reported using social media sources to access information related to COVID-19 showed a lower willingness towards vaccination, with only around 35% expressing their willingness to receive the vaccine when available. In addition, male conservatives show a greater preference for classic broadcast media sources compared to their female conservative counterparts, although they show a slightly lesser preference than male liberals. Nonetheless, the difference between liberal and conservative men regarding their preference for classic broadcast media sources is not substantial.

TABLE. 1 --- Proportion of Respondents: Willingness to get vaccinated, by use of online sources

Q100_sources_used	Political Orientation	Gender	Prop_vaccine
Classic Broadcast	Conservative	Male	0.640
Government	Conservative	Male	0.476
Social Media	Conservative	Male	0.581
Classic Broadcast	Liberal	Male	0.730
Government	Liberal	Male	0.823
Social Media	Liberal	Male	0.727
Classic Broadcast	Conservative	Female	0.418
Government	Conservative	Female	0.232
Social Media	Conservative	Female	0.350
Classic Broadcast	Liberal	Female	0.671
Government	Liberal	Female	0.695
Social Media	Liberal	Female	0.633

Table 1: Proportion of respondents: willingness to get vaccinated, by use of online sources

However, a distinctly different pattern emerges when examining the proportion of respondents who reported wearing masks in indoor public spaces, stratified by the usage of online sources, as shown in Table 2. Although there are some minor differences between male conservatives and with regard to their mask-wearing practices, these are not particularly significant. Arguably, the figure suggests that the vast majority of respondents, regardless of their online source preferences, adhered to the practice of wearing masks in indoor public spaces.

TABLE. 2 --- Proportion of Respondents: Wore mask indoors in public spaces in the last week, by use of online sources

Q100_sources_used	Political Orientation	Gender	Prop_mask		
Classic Broadcast	Conservative	Male	0.819		
Government	Conservative	Male	0.768		
Social Media	Conservative	Male	0.854		
Classic Broadcast	Liberal	Male	1		
Government	Liberal	Male	1		
Social Media	Liberal	Male	0.991		
Classic Broadcast	Conservative	Female	0.952		
Government	Conservative	Female	0.918		
Social Media	Conservative	Female	0.843		
Classic Broadcast	Liberal	Female	0.966		
Government	Liberal	Female	1		
Social Media	Liberal	Female	0.987		

Table 2: Proportion of respondents who wore mask indoors in public spaces in the last week, by use of online sources

TABLE. 3 --- Demographics by Race_Ethnicity and Age

Race_Ethnicity	Age	N	Prop
White	18-29	131	0.0922
White	30-44	207	0.146
White	45-59	278	0.196
White	60+	405	0.285
Black	18-29	22	0.0155
Black	30-44	31	0.0218
Black	45-59	34	0.0239
Black	60+	38	0.0267
Hispanic	18-29	36	0.0253
Hispanic	30-44	48	0.0338
Hispanic	45-59	47	0.0331
Hispanic	60+	29	0.0204
Other_nonhispanic	18-29	21	0.0148
Other_nonhispanic	30-44	33	0.0232
Other_nonhispanic	45-59	27	0.0190
Other_nonhispanic	60+	34	0.0239

Table 3: Demographics by Race_Ethnicity & Age

TABLE. 4 --- Demographics by Age and Gender

Age	Gender	N	Prop
18-29	Male	111	0.0781
18-29	Female	99	0.0697
30-44	Male	163	0.115
30-44	Female	156	0.110
45-59	Male	201	0.141
45-59	Female	185	0.130
60+	Male	227	0.160
60+	Female	279	0.196

Table 4: Demographics by Age & Gender

In examining the various social media sources included in the dataset, it is important to provide a description of each type. The social media sources focused in this study were

Facebook, Twitter, Instagram, Youtube, Reddit, WhatsApp, and TikTok. Other types of online sources were Health Institutions (e.g., WHO and CDC), Government websites, BBC, CNN, and FoxNews websites or applications. While Facebook, Twitter, and others fall under the category of social media, they exhibit different characteristics (Johnson & Kaye, 2015). Facebook continues to be a widely preferred application. Facebook, as seen in Table 5, accounted for 38% of respondents who used Facebook as one of their preferred social media sources to obtain COVID-19 information in the past 24 hours. Social connections on Facebook are primarily formed among individuals who are friends or acquaintances in real life – where individuals are required to accept each other’s friend requests in order to engage in each other’s conversations and view their social networks (Johnson & Kaye, 2015). Twitter, on the other hand, operates differently. Twitter accounted for 10% of respondents who used Twitter as one of their preferred social media sources used for COVID-19 information in the last 24 hours. Social media has long been recognized as a forum for public conversations, where individuals may or may not be acquainted yet initiate discussions and even debates (Johnson & Kaye, 2015). Its distinct features: character limitation, hashtags, and prompting public discussions, makes Twitter function more as a microblogging social media. The second most used social media seen in the descriptives is Youtube. 14% of respondents used Youtube as one of their preferred social media sources for COVID-19 information. While Youtube encompasses certain elements of a social networking site, it also acts as a search engine – providing a hybrid usage. Youtube has gained significant popularity as a news outlet among many Americans. Around 26% of all U.S. adults rely on Youtube as a source of news (Pew Research Center, 2020). Although a minority consider it as their primary source, it is considered as an important way to keep informed (Pew Research Center, 2020). Reddit also distinguishes itself from other social media by creating a culture that discourages the use of real names as a privacy protection measure. The conversations taking place on Reddit predominantly occur in a public setting, allowing anyone, to view content without necessarily needing an account. Individuals on Reddit can engage in subreddits which

are discussion based forums within the application. Around 7% of respondents used Reddit as one of their preferred social media sources to obtain COVID-19.

Instagram, Snapchat, and TikTok, despite their popularity (especially among the younger demographic), presented a lower percentage of usage with Instagram being the highest (8%) of them. These social media sources feature a strong emphasis on visuals, aesthetics, and editing capabilities that create influence on popular culture more than other types of social media. WhatsApp also presented a lower percentage of usage (2%) for COVID-19 information, however, similarly to Facebook, WhatsApp serves as a popular and practical method of communication specifically designed for interacting with close friends and family (WhatsApp).

Although we observed variations in social media usage among popular sources, with Facebook emerging as the top choice for accessing the information on COVID-19 while Snapchat lagged behind at 1% usage, we observed a more balanced pattern of engagement with traditional media (CNN, FoxNews). These traditional media sources, accessible through their official websites or applications, demonstrate a more even distribution of usage among respondents. Similar observations can be seen with other online sources such as health institutions (e.g., CDC and WHO) and official government websites.

TABLE. 5 --- Descriptives of Different Types of Social Media & Online Sources

Variables	Mean	Standard Error
Facebook	0.38071	0.0167
Twitter	0.10134	0.0107
Youtube	0.1439	0.0129
TikTok	0.025616	0.0059
Whatsapp	0.021022	0.0054
Instagram	0.081248	0.0103
Snapchat	0.014201	0.0046
Reddit	0.072095	0.0094
Health Institutions (e.g., WHO, CDC)	0.10984	0.0106
Government websites	0.11003	0.0104
BBC website or app	0.037117	0.0062
CNN website or app	0.14172	0.0119
Fox News website or app	0.11167	0.0101

Table 5. Descriptives of Social Media and Online Sources usage from respondents who used at least one type of social media in the past 24 hours to obtain information on COVID-19.

6. Analysis

We built up the models using the Akaike Information Criterion (AIC) decision-making criterion (Akaike, H. 1973), starting with an additive baseline model that included different variables (seen in Figure 1) as predictors for predicting two key pro-social behaviors during the COVID-19 pandemic: mask-wearing and willingness to get vaccinated for COVID-19. The outcome of this approach is presented in the following two AIC tables, labeled Table A and Table B, which rank the models in ascending order of AIC values. To streamline our main analysis, we have included Table 6 and Table 7 in this section. These two tables represent the best-fitted models, identified based on the lowest AIC values from the respective AIC Tables A and B. The models with the lowest AIC value both included social media (SM), demographics (DEMO), political orientation (PO), social responsibility (SR), and government trust variables

(TR). For more information and additional model comparisons, the rest of the models can be found in the appendix.

TABLE A: AIC Table for Vaccine Willingness Generalized Linear Models (GLM) with Variable Inclusion			
Rank	Name	AIC (best to least)	
1	SM+DEMO+PO+SR+TR	1109.178828	
2	SM+DEM+PO+SR+TR+CEN	1110.677525	
3	SM+DEM+PO+SR	1136.022365	
4	SM+DEM+PO	1173.110259	
5	SM+DEM	1239.154612	
6	SM	1297.171144	

Table A: AIC Table for Vaccine Willingness GLM with Variable Inclusion. AIC is a statistical measure used to evaluate the relative performance of multiple models and determines which is best fitted to the data and model simplicity (Akaike, H. 1973).

TABLE B: AIC Table for Mask-Wearing Practices Generalized Linear Models (GLM) with Variable Inclusion			
Rank	Name	AIC (best to least)	
1	SM+DEMO+PO+SR+TR	322.7363177	
2	SM+DEM+PO+SR	323.856891	
3	SM+DEM+PO+SR+TR+CEN	328.6992339	
4	SM+DEM+PO	368.3153381	
5	SM	432.968862	
6	SM+DEM	436.389967	

Table B: AIC Table for Mask Wearing GLM with Variable Inclusion (Akaike, H. 1973).

To better understand the impact of exposure to social media sources on these behaviors, the models focused specifically on the social media sources used by respondents within a 24-hour period. Social media usage, specifically for this study, is defined as respondents who reported using at least one form of social media within the 24-hour time frame to obtain news or information related to COVID-19. Below I will discuss the interpretation of each significant parameter.

Respondent's age, gender, race/ethnicity, and usage of Reddit as a source of information for COVID-19 were found to be significantly associated with willingness to get vaccinated for COVID-19 seen in Table 6. More specifically, respondents who used Reddit as a source to obtain news on COVID-19 were significantly associated with willingness to get vaccinated for COVID-19 compared to Facebook, YouTube, TikTok, and other online sources measured. A one-unit increase in Reddit exposure was associated with 2.27 times increase in the odds of willingness to get vaccinated (OR: 2.27; CI: 0.90). Sources such as Facebook, Twitter, Youtube, TikTok, and WhatsApp were not found statistically significant, however, Youtube, and TikTok do show a negative association with willingness to get vaccinated for COVID-19.

Furthermore, in comparison to other racial and ethnic groups, Black respondents exhibited a statistically significant inclination toward a decreased willingness to receive the COVID-19 vaccination. The odds of Black respondents are about 74.5% lower than the odds of White respondents (OR: 0.25; CI: 0.99). Respondents with age60+ were more likely to be willing to receive the vaccination compared to younger individuals (OR: 3.5; CI: 0.99). The odds of being willing to get vaccinated among respondents aged 60 years or older are over two times higher than the odds of being willing to get vaccinated among younger respondents.

Women were less likely to be willing to get vaccinated for COVID-19 compared to men. The odds of being willing to get vaccinated among females were about 46% lower than the odds of being willing to get vaccinated among men (OR: 0.54; CI: 0.99). Both variables 'Social Responsibility' and 'Political Orientation' were significantly associated with willingness to get vaccinated even after being controlled. The odds of being willing to get vaccinated among respondents who found pro-social behavior important to the health and safety of their community were over two times higher than the odds of being willing to get vaccinated among respondents who did not (OR: 3.04; CI: 0.99). The odds of having the willingness to get vaccinated for COVID-19 among liberal respondents are about 1.4 times (or 141.64%) higher

than the odds among respondents who identified as conservative (OR: 2.41; CI: 0.99). In addition, government state trust was found to be positively associated with willingness to get vaccinated (OR: 2.34; CI: 0.99).

TABLE 6. --- GLM Analysis of Sources of Social Media and Vaccine Willingness in Wave 1 (SM+DEMO+POLI+SR+TRUST)

Variables	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	-1.60011	0.2018751	0.30683	-5.215	2.26e-07 ***
Facebook	-0.18323	0.8325787	0.16713	-1.096	0.273209
Twitter	0.14933	1.1610542	0.28376	0.526	0.598835
Youtube	0.01599	1.0161210	0.24899	0.064	0.948801
TikTok	-0.33748	0.7135664	0.64067	-0.527	0.598482
Whatsapp	0.96348	2.6207976	0.55254	1.744	0.081536 .
Reddit	0.82265	2.2765256	0.41547	1.980	0.047991 *
Instagram	0.54445	1.7236683	0.36083	1.509	0.131662
Snapchat	-0.48489	0.6157655	0.84659	-0.573	0.566948
Health Institutions Web/App	0.31094	1.3647044	0.26774	1.161	0.245803
Government Web	-0.05844	0.9432336	0.26099	-0.224	0.822870
age30-44	0.28350	1.3277721	0.24965	1.136	0.256417
age45-59	0.07638	1.0793775	0.2518	0.303	0.761685
age60+	1.25276	3.4999923	0.26216	4.779	2.05e-06 ***
sexfemale	-0.61878	0.5386035	0.16903	-3.661	0.000266 ***
race_ethnicityblack_nonhispanic	-1.36701	0.2548679	0.30249	-4.519	7.00e-06 ***
race_ethnicityother_nonhispanic	0.02334	1.0236186	0.28618	0.082	0.935005
race_ethnicityhispanic	-0.40521	0.6668365	0.24867	-1.629	0.103548
Q56liberal	0.88227	2.4163713	0.1773	4.976	7.73e-07 ***
Q90_social_responsibility	1.11232	3.0414058	0.22908	4.856	1.41e-06 ***
Q69_state_trust	0.85424	2.3495818	0.18255	4.680	3.30e-06 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 6. GLM Analysis of Sources of Social Media and Vaccine Willingness in Wave 1.

The results seen in Table 7 indicate that the respondents' race and ethnicity, age, as well as their sense of social responsibility, and political orientation, were significantly associated with their adherence to mask-wearing practices. Specifically, the odds of reporting mask-wearing practices among other non-Hispanic respondents are more than 5 times greater than that among White respondents. Social responsibility and political orientation were found statistically significant in the outcome variable of mask-wearing practices in this model. The odds of reporting

behaviors remains unclear (Lin et al., 2021). By implementing a step-by-step procedure analysis that considers the role of political orientation, social responsibility, demographics, and government trust, the current study sheds light on the complex nature of the relationship between social media exposure and pro-social behaviors.

According to our empirical tests through our two best fitting models: respondents who viewed pro-social behavior as important are more likely to be willing to get vaccinated suggesting that they see vaccination as a way to protect themselves, but also their community. And because the odds difference is quite significant, it may indicate that social responsibility is likely an essential factor in willingness to get vaccinated. In addition, the difference in odds ratios showed a moderately large difference, indicating that political orientation may be an important predictor of willingness to get vaccinated for COVID-19, at least among respondents who identified as liberal. In addition, the positive association between government state trust and vaccine willingness, compared to mask-wearing, can be possibly explained by several factors. The strict mask mandates during the early stages of the COVID-19 pandemic may have minimized the impact of government state trust on wearing masks. A COVID-19 vaccine was not readily available during this time which may have likely intensified opinions surrounding vaccine willingness. And third, the coronavirus and vaccination process being already heavily politicized may have contributed to the heightened opinions on willingness to get vaccinated for COVID-19. The findings suggest that this relationship is not simply a bivariate association, but rather is interactive by individuals' sense of social responsibility, which in turn may be influenced by their political orientation. Furthermore, the findings suggest that social and cultural factors, such as government trust and demographics, may play a significant role in shaping individual health behaviors, even in the context of a public health crisis like the COVID-19 pandemic.

Despite the widespread usage of social media and attention in both academic and

non-academic settings, it appears that its impact on shaping peoples' health behavior remains less impactful than originally believed. These findings suggest that there may be additional factors that influence the association between exposure to social media sources and adherence to pro-social behavior.

Popular social media sources such as Facebook, Twitter, Youtube, and TikTok were not found to have a statistically significant association with either willingness to get vaccinated for COVID-19 or mask-wearing practices. In contrast, Reddit was found to have a significant association. While the reasons for this discrepancy are unclear, it does raise the need for a deeper examination of the functional differences between these social media sources. In other words, attention should be given to how their distinct layouts and algorithms may shape the sharing, receiving, and consumption of information among individuals. The negative association between Black respondents and willingness to get vaccinated for COVID-19 suggests there may be specific barriers or challenges that need to be addressed in order to increase COVID-19 vaccination rates among Black individuals (Bogart et al., 2021). When interpreting the findings, it is important to exercise caution. While the results provide valuable information, these results may be limited by potential predictor variables that were not controlled for. However, it is important to acknowledge the systemic issues such as historical medical mistreatment and mistrust, as well as other factors such as vaccine hesitancy and access to healthcare, and to approach the interpretation of results with care. Addressing these barriers could be crucial in promoting equity and improving public health outcomes related to COVID-19.

It is important to clarify that the measure of social responsibility utilized in this study does not imply that individuals who do not prioritize pro-social behavior lack a sense of responsibility during the COVID-19 pandemic. As I have noted in my proposed conceptual framework, social responsibility can be activated by both ends of the political spectrum, which may manifest differently, potentially reflecting varying priorities informed by one's political

ideology.

8. Limitations

The study had a few limitations. Firstly, is that it only analyzed data from the first wave of the survey, which does not capture potential changes in pro-social behavior that may have occurred over time. It is worth noting that the COVID-19 vaccine became available to the general public during the third wave of the survey. Secondly, the results of the study suggest that there may be significant differences in mask-wearing practices by race and ethnicity, with respondents identifying as ‘other_nonhispanic’ being more than five times as likely to report mask-wearing practices as White respondents. However, it is important to interpret these findings with caution, as this category includes multiple races and ethnicities. Therefore, the specific differences between different races and ethnicities are not captured in the analysis. The results only indicate an overall trend, and future research should further investigate the nuanced relationship between race and pro-social behaviors. Third, a limitation pertains to the unknown frequency of online sources usage per source, which could significantly influence health behavior. Additionally, some respondents may use multiple sources in different ways, or use different sources for different types of information or interactions, which could make it difficult to isolate the effects of individual sources on health behavior. To try to address this limitation, a unique aspect of the data used in this study provides information on the sources used by respondents within a 24-hour time frame. Although the study did not account for the duration of social media usage for information on COVID-19, it was able to provide insight into the specific sources utilized by respondents for such information, as opposed to solely relying on their overall preference in news consumption. Future research should consider applying different statistical techniques to account for the complexity of the relationship among these social media variables.

9. Future Directions for this line of research

9.1. Perception of Credibility

Researchers have continued to better understand why individuals rely on media sources they do not perceive as credible (Johnson & Kaye, 2015). Given the pervasiveness of social media use during the COVID-19 pandemic, it is important to continue to investigate the relationship between social media usage and the perception of credibility. Specifically, future research should aim to explore why individuals might continue to use social media as sources of information on COVID-19 even if they do not perceive them to be credible. By examining this phenomenon, we can gain a deeper understanding of the factors that may influence individuals' choices of online media sources. This will not only contribute to our understanding of social media usage during the pandemic but also inform the development of effective public health messaging and communication strategies.

Credibility is a significant determinant of the impact of communication, as shown by previous research studies. However, the abundance of information, including misinformation, on social media sources makes differentiating between credible and non-credible sources increasingly difficult, especially when political narratives can distort opposing viewpoints as “fake news.” Although previous research has extensively examined the information consumption patterns of Americans, this research has primarily focused on mainstream media such as television networks (e.g., Fox News and MSNBC). Consequently, little is known about how social media sources differ in their ability to influence people's behaviors and how these sources are shared within their networks, specifically in the context of pro-social behavior during the COVID-19 pandemic. The next step for this research study is to apply a social network analysis (SNA) approach to examine the networked consumption relationships of media sources. This unique approach will explore the effects of personal networks (e.g., number of friends, family, coworkers) and social media sources, consumption, political orientation, and

perceptions of trust on pro-social behavior during COVID-19. By examining the relationship of social networks, the potential diffusion pathways for the adoption of pro-social information from different sources, such as friends, peers, and communal members, or news sources, formal or informal, on COVID-19 health-preventative measures can be explored. This approach will contribute to the current body of literature by providing a unique perspective on the influence of social media on pro-social behavior during the COVID-19 pandemic.

10. Summary and Conclusion

This study has provided insights into the relationship between sources of social media exposure and adherence to pro-social behavior in the context of the United States during the COVID-19 pandemic. The findings highlight the importance of considering the role of social responsibility, political orientation, government trust, demographics, and the specific sources of social media in understanding health behaviors. The results suggest that social media sources can be a powerful tool in promoting pro-social behaviors during the COVID-19 pandemic, but their effectiveness may vary depending on the type of source used, and the social and cultural factors that interplay with each other. Further research is needed to explore the long-term impact of social media exposure on health behaviors and to identify effective strategies for promoting pro-social behaviors in the context of the COVID-19 pandemic.

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11. Appendix

11.1 Step-by-step procedures

This appendix section serves the purpose of presenting additional models in a step-by-step procedure used to examine the association between sources of social media exposure and adherence to pro-social behavior during the COVID-19 pandemic in the United States. The process includes presenting various models at each stage of organizing the set variables and observing their interactions. To ensure a more robust analysis, the Akaike Information Criterion (AIC) test is utilized to assess the performance of different models. It is important to note that the final analysis and conclusions are based on the two models with the lowest AIC scores, which are highlighted in the main analysis section of this paper.

The following tables [8-13] correspond to the GLM model for vaccine willingness outcomes.

TABLE 8. GLM Analysis of Sources of Social Media and Vaccine Willingness in Wave 1 (SM)					
Variables	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	0.38339	---	0.10467	3.663	0.000263 ***
Facebook	-0.20979	0.8107513	0.14992	-1.399	0.162039
Twitter	0.26447	1.3027357	0.25374	1.042	0.297555
Youtube	-0.16858	0.8448622	0.22073	-0.764	0.445210
TikTok	-0.01534	0.9847761	0.52762	-0.029	0.976810
Whatsapp	0.73090	2.0769409	0.61204	1.194	0.232697
Reddit	1.34899	3.8535406	0.39419	3.422	0.000648 ***
Instagram	0.03930	1.0400834	0.30869	0.127	0.898718
Snapchat	-0.66841	0.5125217	0.80447	-0.831	0.406254
Health Institutions Web/App	0.26063	1.2977504	0.24192	1.077	0.281597
Government Web	0.01461	1.0147188	0.23506	0.062	0.950447
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Table 8. GLM model of sources of social media and vaccine willingness only.

TABLE 9. GLM Analysis of Sources of Social Media and Vaccine Willingness in Wave 1 (SM+ DEM)

Variables	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	0.267460	1.3066420	0.234545	1.140	0.254432
Facebook	-0.153271	0.8578970	0.155750	-0.984	0.325323
Twitter	0.347229	1.4151413	0.272253	1.275	0.202482
Youtube	-0.073470	0.9291644	0.235366	-0.312	0.754995
TikTok	-0.020771	0.9794429	0.583216	-0.036	0.971597
Whatsapp	0.865775	2.3768476	0.623304	1.389	0.165155
Reddit	1.356289	3.8817612	0.397529	3.412	0.000673 ***
Instagram	0.437616	1.5490095	0.325274	1.345	0.178824
Snapchat	-0.611952	0.5422913	0.812652	-0.753	0.451618
Health Institutions Web/App	0.238739	1.2696467	0.249257	0.958	0.338406
Government Web	-0.049732	0.9514848	0.235565	-0.211	0.832842
age30-44	0.330512	1.3916811	0.236644	1.397	0.162839
age45-59	-0.004883	0.995129	0.23778	-0.021	0.983620
age60+	1.168364	3.2167253	0.241664	4.835	1.55e-06 ***
sexfemale	-0.450690	0.6371886	0.152	-2.965	0.003102 **
race_ethnicityblack_nonhispanic	-0.929099	0.3949092	0.262125	-3.544	0.000412 ***
race_ethnicityother_nonhispanic	0.283555	1.3278422	0.278057	1.020	0.308096
race_ethnicityhispanic	-0.039187	0.9615708	0.232664	-0.168	0.866282
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Table 9. GLM model of social media sources and vaccine willingness with demographic variables added.

TABLE 10. --- GLM Analysis of Sources of Social Media and Vaccine Willingness in Wave 1 (SM + DEMO + POLITICAL ORIENT

Variables					
	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	-0.35258	0.7028748	0.24866	-1.418	0.156541
Facebook	-0.14607	0.8641015	0.16052	-0.910	0.363081
Twitter	0.32519	1.3842915	0.28308	1.149	0.250949
Youtube	-0.05435	0.9470994	0.24108	-0.225	0.821681
TikTok	-0.16248	0.8500332	0.61151	-0.266	0.790525
Whatsapp	0.85472	2.3507236	0.63778	1.340	0.180516
Reddit	1.05423	2.8697575	0.40558	2.599	0.009487 **
Instagram	0.50779	1.6616131	0.35521	1.430	0.153177
Snapchat	-0.63364	0.5306578	0.80835	-0.784	0.433315
Health Institutions Web/App	0.30262	1.3534065	0.26148	1.157	0.247428
Government Web	-0.07227	0.9302827	0.24088	-0.300	0.764232
age30-44	0.28629	1.3314775	0.24228	1.182	0.237638
age45-59	0.16150	1.1752715	0.24278	0.665	0.506073
age60+	1.30741	3.6965796	0.24877	5.256	1.83e-07 ***
sexfemale	-0.53740	0.5842665	0.1589	-3.382	0.000749 ***
race_ethnicityblack_nonhispanic	-1.24737	0.2872605	0.29075	-4.290	1.97e-05 ***
race_ethnicityother_nonhispanic	0.16896	1.1840732	0.27885	0.606	0.544721
race_ethnicityhispanic	-0.28271	0.7537353	0.24251	-1.166	0.244003
Q56liberal	1.12386	3.0767147	0.16539	6.795	1.91e-11 ***

Table 10. GLM model of sources of social media and vaccine willingness with demographic and political orientation variables added.

TABLE 11. GLM Analysis of Sources of Social Media and Vaccine Willingness in Wave 1 (SM + DEMO + POLI+SR)

Variables	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	-1.06237	0.3456341	0.29213	-3.637	0.000291 ***
Facebook	-0.16569	0.8473128	0.16613	-0.997	0.318863
Twitter	0.20732	1.2303782	0.28198	0.735	0.462384
Youtube	-0.03840	0.9623282	0.25091	-0.153	0.878397
TikTok	-0.32466	0.7227735	0.66760	-0.486	0.626864
Whatsapp	0.91788	2.5039649	0.58759	1.562	0.118604
Reddit	0.86148	2.3666559	0.41036	2.099	0.036057 *
Instagram	0.52096	1.6836395	0.37238	1.399	0.162146
Snapchat	-0.49011	0.6125619	0.93669	-0.523	0.600937
Health Institutions Web/App	0.30619	1.3582432	0.26198	1.169	0.242804
Government Web	-0.08219	0.9210945	0.2459	-0.334	0.738267
age30-44	0.28374	1.328086	0.25341	1.120	0.263140
age45-59	0.06747	1.0698012	0.25306	0.267	0.789811
age60+	1.19196	3.2935329	0.258	4.620	4.37e-06 ***
sexfemale	-0.59456	0.5518046	0.16695	-3.561	0.000388 ***
race_ethnicityblack_nonhispanic	-1.31286	0.2690501	0.30422	-4.315	1.76e-05 ***
race_ethnicityother_nonhispanic	0.08054	1.0838743	0.28133	0.286	0.774719
race_ethnicityhispanic	-0.40283	0.6684235	0.25346	-1.589	0.112328
Q56liberal	0.86235	2.3687204	0.17237	5.003	6.75e-07 ***
Q90_social_responsibility	1.24721	3.4806237	0.22665	5.503	4.83e-08 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 11. GLM model of social media sources and vaccine willingness with demographic, political orientation, and social responsibility variables added.

TABLE 12. GLM Analysis of Sources of Social Media and Vaccine Willingness in Wave 1 (SM + DEMO + POLI+SR+ECO)

Variables	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	-0.91066	0.4022567	0.33664	-2.705	0.006951 **
Facebook	-0.16940	0.8441740	0.16711	-1.014	0.310992
Twitter	0.18027	1.1975409	0.28455	0.634	0.526551
Youtube	-0.02888	0.9715291	0.25850	-0.112	0.911057
TikTok	-0.35969	0.6978935	0.67951	-0.529	0.596697
Whatsapp	0.93778	2.5543143	0.60791	1.543	0.123260
Reddit	0.82460	2.2809616	0.41371	1.993	0.046532 *
Instagram	0.50665	1.6597147	0.37829	1.339	0.180797
Snapchat	-0.36542	0.6939045	0.95639	-0.382	0.702487
Health Institutions Web/App	0.34059	1.405778	0.26729	1.274	0.202896
Government Web	-0.07015	0.9322513	0.24743	-0.284	0.776832
age30-44	0.30196	1.3525075	0.25437	1.187	0.235501
age45-59	0.06949	1.0719609	0.25498	0.273	0.785272
age60+	1.21079	3.3561513	0.26127	4.634	4.09e-06 ***
sexfemale	-0.60134	0.5480746	0.16614	-3.620	0.000311 ***
race_ethnicityblack_nonhispanic	-1.26265	0.2829025	0.30998	-4.073	5.03e-05 ***
race_ethnicityother_nonhispanic	0.10559	1.1113658	0.28809	0.367	0.714064
race_ethnicityhispanic	-0.34104	0.7110306	0.25434	-1.341	0.180291
Q56liberal	0.84207	2.3211595	0.17475	4.819	1.68e-06 ***
Q90_social_responsibility	1.25927	3.5228431	0.22722	5.542	3.89e-08 ***
PPREG42 (Ecological)	0.08860	1.0926434	0.26932	0.329	0.742247
PPREG43	-0.32384	0.723367	0.23964	-1.351	0.176916
PPREG44	-0.26626	0.7662392	0.25363	-1.050	0.294087

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 12. GLM model of social media sources and vaccine willingness with demographic, political orientation, social responsibility, and ecological variables added. The variable 'PPREG4' includes the census region (Northeast, Midwest, South, and West).

TABLE 13. GLM Analysis of Sources of Social Media and Vaccine Willingness in Wave 1 (SM + DEMO + POLI+SR+CENSUS+TRUST)

Variables	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	-1.40497	0.2453747	0.35555	-3.952	8.35e-05 ***
Facebook	-0.19063	0.8264410	0.16785	-1.136	0.256369
Twitter	0.11862	1.1259423	0.28420	0.417	0.676490
Youtube	0.03175	1.0322579	0.25547	0.124	0.901124
TikTok	-0.37177	0.6895133	0.65719	-0.566	0.571740
Whatsapp	0.96347	2.6207712	0.56743	1.698	0.089850 .
Reddit	0.78621	2.1950578	0.42373	1.855	0.063848 .
Instagram	0.52307	1.6871967	0.36121	1.448	0.147929
Snapchat	-0.34971	0.7048940	0.86190	-0.406	0.685027
Health Institutions Web/App	0.34737	1.4153448	0.27102	1.282	0.200262
Government Web	-0.04087	0.9599531	0.26219	-0.156	0.876161
age30-44	0.30938	1.3625806	0.25083	1.233	0.217735
age45-59	0.07690	1.0799344	0.25385	0.303	0.762010
age60+	1.27904	3.5931833	0.26689	4.792	1.92e-06 ***
sexfemale	-0.62369	0.5359632	0.16805	-3.711	0.000218 ***
race_ethnicityblack_nonhispanic	-1.31254	0.2691358	0.30904	-4.247	2.38e-05 ***
race_ethnicityother_nonhispanic	0.04556	1.0466121	0.29476	0.155	0.877203
race_ethnicityhispanic	-0.34322	0.709484	0.24879	-1.380	0.168061
Q56liberal	0.85849	2.3595839	0.17988	4.773	2.11e-06 ***
Q90_social_responsibility	1.11804	3.0588458	0.2284	4.895	1.16e-06 ***
PPREG42	0.02384	1.0241315	0.27272	0.087	0.930345
PPREG43	-0.39383	0.6744707	0.24479	-1.609	0.107990
PPREG44	-0.31759	0.7279021	0.26338	-1.206	0.228194
Q69_state_trust	0.87404	2.3965641	0.18415	4.746	2.40e-06 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 13. GLM model of social media sources and vaccine willingness with demographic, political orientation, social responsibility, ecological variables, and government trust variables added.

The next following tables [14-19] correspond to the GLM model for mask-wearing outcomes.

TABLE 14. GLM Analysis of Sources of Social Media and Mask Wear Practices in Wave 1 (SM)

Variables					
	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	2.88049		0.22471	12.818	<2e-16 ***
Facebook	-0.20278		0.28857	-0.703	0.482
Twitter	0.02724		0.50614	0.054	0.957
Youtube	-0.41247		0.36828	-1.120	0.263
TikTok	-0.34000		0.86164	-0.395	0.693
Whatsapp	0.27545		0.96038	0.287	0.774
Instagram	0.79079		0.71898	1.100	0.272
Health Institutions	-0.41375		0.43388	-0.954	0.341
Government Web	0.22541		0.44618	0.505	0.614
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Table 14. GLM model of sources of social media (only) and mask-wear practices.

TABLE 15. GLM Analysis of Sources of Social Media and Mask Wear Practices in Wave 1 (SM+DEMO)

Variables					
	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	2.19774	9.0046289	0.45305	4.851	1.44e-06 ***
Facebook	-0.25160	0.7775553	0.28358	-0.887	0.3752
Twitter	0.21437	1.2390794	0.51602	0.415	0.6779
Youtube	-0.39376	0.6745172	0.39578	-0.995	0.3201
TikTok	-0.22724	0.7967294	0.87348	-0.260	0.7948
Whatsapp	-0.01368	0.9864139	0.92894	-0.015	0.9883
Instagram	0.79473	2.2138541	0.73515	1.081	0.2800
Health Institutions	-0.41114	0.6628913	0.45387	-0.906	0.3652
Government Web	0.27662	1.3186604	0.44410	0.623	0.5335
age30-44	0.35936	1.4324162	0.42200	0.852	0.3947
age45-59	0.15945	1.1728612	0.42179	0.378	0.7055
age60+	0.87388	2.3961816	0.44914	1.946	0.0520 .
sexfemale	0.23185	1.2609262	0.28514	0.813	0.4164
race_ethnicityblack_nonhispanic	0.62049	1.8598451	0.67195	0.923	0.3560
race_ethnicityother_nonhispanic	1.42912	4.1750197	0.69226	2.064	0.0393 *
race_ethnicityhispanic	0.58761	1.7996838	0.51912	1.132	0.2580
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Table 15. GLM model of sources of social media and mask-wear practices with demographic variables added.

TABLE 16. GLM Analysis of Sources of Social Media and Mask Wear Practices in Wave 1 (SM+DEMO+POLIT)

Variables	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	1.13805	3.1206684	0.43408	2.622	0.00889 **
Facebook	-0.21443	0.8070046	0.30287	-0.708	0.47914
Twitter	0.42981	1.5369681	0.55117	0.780	0.43570
Youtube	-0.37707	0.6858706	0.39859	-0.946	0.34440
TikTok	-0.83633	0.4332979	0.83097	-1.006	0.31447
Whatsapp	0.26254	1.3002276	1.09447	0.240	0.81048
Instagram	1.54770	4.7006653	0.95599	1.619	0.10581
Health Institutions	-0.54915	0.5774421	0.52388	-1.048	0.29482
Government Web	0.19287	1.212724	0.51991	0.371	0.71075
age30-44	0.45030	1.5687808	0.44462	1.013	0.31144
age45-59	0.74836	2.113529	0.42094	1.778	0.07577 .
age60+	1.26854	3.5556488	0.45906	2.763	0.00584 **
sexfemale	0.14797	1.1594825	0.30237	0.489	0.62469
race_ethnicityblack_nonhispanic	0.02623	1.0265772	0.67145	0.039	0.96885
race_ethnicityother_nonhispanic	1.91782	6.8061058	0.79980	2.398	0.01669 *
race_ethnicityhispanic	0.08796	1.0919468	0.53583	0.164	0.86964
Q56liberal	2.31357	10.1104153	0.40531	5.708	1.55e-08 ***
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Table 16. GLM model of sources of social media and mask-wear practices with demographic and political orientation variables added.

TABLE 17. GLM Analysis of Sources of Social Media and Mask Wear Practices in Wave 1 (SM+DEMO+POLIT+SR)

Variables	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	0.43178	1.5400013	0.45964	0.939	0.34778
Facebook	-0.20408	0.8153988	0.31784	-0.642	0.52098
Twitter	0.30676	1.3590094	0.68186	0.450	0.65290
Youtube	-0.33315	0.7166622	0.43448	-0.767	0.44341
TikTok	-0.83699	0.4330131	0.70766	-1.183	0.23722
Whatsapp	0.28494	1.3296774	0.83863	0.340	0.73411
Instagram	1.36770	3.9263037	0.92707	1.475	0.14048
Health Institutions	-0.72550	0.4840825	0.51409	-1.411	0.15852
Government Web	0.02052	1.0207314	0.47625	0.043	0.96564
age30-44	0.30783	1.3604676	0.46428	0.663	0.50748
age45-59	0.53768	1.7120314	0.46303	1.161	0.24586
age60+	0.95116	2.5887021	0.48141	1.976	0.04849 *
sexfemale	0.02097	1.0211868	0.33659	0.062	0.95035
race_ethnicityblack_nonhispanic	-0.40997	0.6636698	0.77015	-0.532	0.59463
race_ethnicityother_nonhispanic	1.93238	6.9059424	0.86248	2.240	0.02530 *
race_ethnicityhispanic	-0.20999	0.8105944	0.53521	-0.392	0.69490
Q56liberal	1.66133	5.2662974	0.44916	3.699	0.00023 ***
Q90_social_responsibility	2.20903	9.1068613	0.36795	6.004	2.79e-09 ***
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Table 17. GLM model of sources of social media and mask-wear practices with demographic, political orientation, and social responsibility variables added.

TABLE 18. GLM Analysis of Sources of Social Media and Mask Wear Practices in Wave 1 (SM+DEMO+POL+SR+ECO)					
Variables	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	0.30515	1.3568327	0.66401	0.460	0.645944
Facebook	-0.21195	0.8090063	0.31649	-0.670	0.503237
Twitter	0.25670	1.2926574	0.67942	0.378	0.705653
Youtube	-0.34019	0.7116321	0.43813	-0.776	0.437676
TikTok	-0.85441	0.4255362	0.73150	-1.168	0.243106
Whatsapp	0.35249	1.4226044	0.80689	0.437	0.662327
Instagram	1.33792	3.8111053	0.91907	1.456	0.145814
Health Institutions	-0.76787	0.4640001	0.50517	-1.520	0.128857
Government Web	0.05569	1.0572705	0.47785	0.117	0.907248
age30-44	0.28862	1.3345872	0.46145	0.625	0.531826
age45-59	0.53975	1.7155714	0.46522	1.160	0.246278
age60+	0.94604	2.5754987	0.48395	1.955	0.050914
sexfemale	0.02989	1.030345	0.33443	0.089	0.928794
race_ethnicityblack_nonhispanic	-0.49195	0.6114345	0.77865	-0.632	0.527679
race_ethnicityother_nonhispanic	1.97677	7.2193559	0.88774	2.227	0.026211 *
race_ethnicityhispanic	-0.23869	0.7876628	0.52366	-0.456	0.648642
Q56liberal	1.70992	5.5285451	0.45329	3.772	0.000172 ***
Q90_social_responsibility	2.19760	9.0034209	0.36738	5.982	3.18e-09 ***
PPREG42 (Ecological)	0.03083	1.0313053	0.54302	0.057	0.954744
PPREG43	0.31877	1.3754409	0.51163	0.623	0.533403
PPREG44	0.02661	1.0269679	0.53965	0.049	0.960683

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 18. GLM model of social media sources and mask-wear practices with demographic, political orientation, social responsibility, and ecological variables added. The variable 'PPREG4' includes the census region (Northeast, Midwest, South, and West).

TABLE 19. GLM Analysis of Sources of Social Media and Mask Wear Practices in Wave 1 (SM+DEMO+POLIT+SR+ECO +TRUST)

Variables	Estimate	Odds Ratio	Standard Error	t value	P-value
(Intercept)	-0.023028	0.9772353	0.676032	-0.034	0.972834
Facebook	-0.221343	0.8014416	0.319033	-0.694	0.487992
Twitter	0.290005	1.3364342	0.712759	0.407	0.684196
Youtube	-0.283654	0.7530269	0.449729	-0.631	0.528382
TikTok	-0.966781	0.3803053	0.742853	-1.301	0.193442
Whatsapp	0.414479	1.5135821	0.799695	0.518	0.604379
Instagram	1.361565	3.9022943	0.912312	1.492	0.135938
Health Institutions	-0.762581	0.4664608	0.508409	-1.500	0.133983
Government Web	0.021837	1.0220772	0.493332	0.044	0.964704
age30-44	0.290088	1.3365456	0.452833	0.641	0.521942
age45-59	0.629712	1.8770691	0.472059	1.334	0.182554
age60+	1.056121	2.8751965	0.482027	2.191	0.028709 *
sexfemale	0.068443	1.0708394	0.334994	0.204	0.838157
race_ethnicityblack_nonhispanic	-0.535998	0.5850853	0.769274	-0.697	0.486135
race_ethnicityother_nonhispanic	1.914592	6.7841721	0.862545	2.220	0.026689 *
race_ethnicityhispanic	-0.233063	0.7921035	0.522844	-0.446	0.655878
Q56liberal	1.735054	5.6692347	0.455339	3.810	0.000148 ***
Q90_social_responsibility	2.094620	8.122354	0.366947	5.708	1.55e-08 ***
PPREG42 (Ecological)	-0.001308	0.9986924	0.548317	-0.002	0.998097
PPREG43	0.179155	1.1962067	0.519169	0.345	0.730114
PPREG44	0.046586	1.0476883	0.542940	0.086	0.931642
Q69_state_trust	0.537266	1.7113211	0.342659	1.568	0.117251

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 19. GLM model of social media sources and mask-wear practices with demographic, political orientation, social responsibility, ecological variables, and government trust variables added.