

Predicting COVID-19 vaccination intentions with the Theory of Planned Behavior: a survey of
healthcare workers

by

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Abstract

Background: There has been a resurgence in vaccine hesitancy in recent years, possibly exacerbated by the increase in popularity of the internet and online media. This study examined the motivating factors behind healthcare workers' (HCW) vaccine decisions and how media use may influence their decisions as well.

Method: An online survey was distributed to American HCW ($n=192$) who worked in healthcare within the past two years. Measures were sourced from validated instruments and organized based on variables drawn from the Theory of Planned Behavior (TPB) constructs and media use. Data were analyzed using the Statistical Package for the Social Sciences software (SPSS). The reliability of the scales was determined by calculating Cronbach's alpha. To test the research questions and hypotheses, descriptives of variables, Pearson correlation coefficient, one-way ANOVA, and independent samples t-test methods were performed.

Results: Intention, measured among respondents who had not received any doses of the vaccine, was low overall ($M=1.07$, $SD=.28$). A Pearson's correlation showed that social media use for news was significantly and positively correlated with intention ($r=.291$, $p<.05$). An independent samples t-test showed there was a significant difference in the scores for vaccine advice from media sources between the vaccinated and unvaccinated groups; $t(171)=-6.33$, $p<.001$. There was also a significant difference in the scores for vaccine information from other health professionals between the vaccinated and unvaccinated groups; $t(169)=9.89$, $p<.001$. A one-way ANOVA showed there were significant differences in vaccine decisions between subjective norms [$F(3, 169) = 30.97$, $p<.001$] and attitudes [$F(3, 160) = 82.67$, $p<.001$].

Conclusion: The results concluded that unvaccinated HCW have negative attitudes about the COVID-19 vaccine, and are less trusting of the media, their social groups, and fellow HCW

for advice about getting the vaccine. Unvaccinated HCW are a difficult demographic to target, so a better understanding of what motivates their decisions, and the decisions of those who have had at least some doses will prove to be useful in future health campaigns.

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Chapter 1- Introduction

With the rise in prevalence and use of the internet, there has been a noticeable, and potentially related, recent rise in vaccine hesitancy (Betsch et al., 2012). The web, and social media, in particular, have created an environment where anti-vaccination sentiment can be spread with ease and without regulation from health professionals (Stahl et al., 2016). Indeed, social media has been shown to have become a facilitator of misinformation about vaccines and other health topics (Hoffman et al., 2019). Vaccine hesitancy, in relation to misinformation exposure, presents a threat to public health as it increases the risk of epidemics of infectious disease in the future (Żuk & Justyna, 2019). Outbreaks of diseases that have long been controlled by vaccines, such as the measles, have been occurring more often in recent years (du Châtelet et al., 2010), which may be attributed to the recent spread of online anti-vaccination sentiment. Therefore, these anti-vaccination groups must be better understood, especially as a COVID-19 vaccine is being introduced to a global mass public.

Vaccines are widely accepted as one of the most important modern public health achievements, and in the United States have prevented approximately 732,000 deaths, 322 million individual illnesses, and 21 million hospitalizations from 1994 to 2013 (Bradshaw et al., 2020). Similarly, vaccinating as many people as possible against COVID-19 is a key part of combatting the virus and preventing unnecessary illness and death, which leads to herd immunity. Herd immunity is described as the indirect protection from infection given to vulnerable populations when large numbers of immune individuals exist in a population. This means that individuals who cannot be vaccinated, like those who are immunocompromised or allergic to certain vaccine components, are still protected against disease (Randolph & Berreiro, 2020).

In late 2019, the global COVID-19 pandemic began in the city of Wuhan in China's Hubei province. Infection with COVID-19 results in a wide range of symptoms, including fever, cough, shortness of breath, fatigue, muscle aches, headache, loss of taste or smell, sore throat, congestion, nausea, and/or diarrhea. As of January 2022, a total of 63,397,935 COVID-19 cases have been reported in the United States (CDC, 2022). Cases range in severity, but some people get seriously ill from the disease and require hospitalization, and deaths have resulted in all age groups. Especially vulnerable populations include the elderly and those with underlying health conditions, like cardiovascular disease, diabetes, or cancer. Preventative measures proposed by health officials include social distancing of at least six feet, wearing a properly fitted mask, regular handwashing, and, as of January 2021, receiving the recommended doses of the mRNA COVID-19 vaccine (WHO, 2022).

The mRNA COVID-19 vaccine has been proven to have 95% efficacy in the prevention of COVID-19 infection in a multinational trial (Polack et al., 2020). Although relatively new in the public eye, mRNA vaccines have been studied for decades. The mRNA vaccine for COVID-19 triggers an immune response by using mRNA created in a laboratory to teach cells in the body how to make a certain protein. This immune response produces antibodies, which then activate other immune cells to fight off infection, protecting against symptoms caused by a possible COVID-19 infection (CDC, 2022).

Despite the evidence based on vaccine efficacy and the benefits of herd immunity, there has been some hesitancy; initially, nearly 1 in 3 Americans said they would refuse to receive the COVID-19 vaccine in July 2020 (O'Keefe, 2021). A more recent study has shown some improvement in these numbers; a September 2021 study showed that 81% of Americans were

likely to receive the vaccine (Mondal et. al, 2021). However, it is still important to target those nearly 20% of Americans that may be hesitant toward the COVID-19 vaccine.

Audiences that have been known to be hesitant toward vaccination include parents with young children, minorities, lower-income groups, and healthcare workers (henceforth HCW) (Conis, 2014; Dandoy, 1967; Gust et al., 2004). Vaccine hesitancy has led to the recurrences of otherwise preventable diseases and increased illness and mortality in the past (Gross, 2009). It is thus paramount to focus research efforts on communicating the benefits of vaccines to audiences who may be hesitant about a COVID-19 vaccine.

The current study will focus on HCW. A considerable amount of HCW have either expressed concern about the COVID-19 vaccine or have refused to receive the COVID-19 vaccine, which is a cause of concern (Luo et al., 2021). It is important to focus on HCW and their uptake of the COVID-19 vaccine as they work directly with patients infected with COVID-19, which increases the chance of contracting COVID-19 themselves, as well as the rate of transmission to patients who are in hospitals for reasons unrelated to COVID-19. Increasing vaccination rates among HCW would not only protect the workers themselves but would indirectly protect patients (Nguyen et al., 2020).

By understanding the factors that impact the decisions of HCW to get vaccinated, as well as their possible hesitancy, we can inform health communication efforts in the future. Health campaigns have been proven to be an effective way to intervene and prevent disease by influencing public behavior. The data collected from this study will be used to design a unique health campaign to increase rates of vaccination for COVID-19.

Problem Statement

To make progress on the issue of raising COVID-19 vaccination rates among HCW from a health communication perspective, it is important to understand what motivates individuals to engage in certain health behaviors. Many factors may affect intention to participate in a given health behavior, like vaccination: the main factors include attitudes toward vaccination, social pressures to get vaccinated (or to not get vaccinated) from the individual's social network, and the amount of control the individual feels they have over getting vaccinated (Priest, 2015). Health campaigns are proven to be more successful if informed by research, so it is imperative to investigate these factors further (Snyder, 2007).

The attitudes of HCW towards vaccination are important to understand because if individuals attribute negative feelings to the act of getting vaccinated, it decreases the likelihood they will get vaccinated. Therefore, the inverse is true; if individuals have positive feelings toward getting vaccinated, the more likely it is they will get vaccinated (Wolff, 2021). These attitudes can be formed by past experiences and knowledge an individual has about a certain behavior. Events can trigger negative or positive judgments about a given behavior, which affect the kinds of attitudes an individual forms towards the behavior. For example, if a person had a negative experience with drinking or with relatives that deal with alcohol addiction, this can trigger the formation of negative attitudes toward drinking alcohol (Ajzen, 2001).

Another piece of the vaccination puzzle includes the many sources of social influence surrounding the individual about the issue of vaccination. These influencers can come from the individual's interpersonal network, such as family and friends, coworkers, religious leaders, and supervisors (Ajzen, 2019). These social groups impose norms about vaccination, some of which may be favorable towards vaccination, whereas some may be negative; both of which may affect

the individual's decision to get vaccinated (Priest, 2015). In this study, personal influencers surrounding HCW will be researched.

Media, like health information websites and social media, are other sources of social influence that may have an impact on the intentions of an individual as well (Betsch et al., 2012). Social media has created a platform for users to create content that has the potential to spread widely with no filter or review. Research has shown that sensational, false information tends to spread faster than truthful information on social media and that this information is often emotionally compelling (Hoffman et al., 2019). In addition, over half of users who visit health information websites, even those with misinformation, tend to believe all the information is credible (Fox, 2000). This study will research how media, including social media, may influence the behavior, intention, and attitudes of HCW.

Lastly, it is important to look at the degree of control individuals feel they have over their ability to get vaccinated, also called self-efficacy. Several factors may impact an individual's level of self-efficacy, and in the context of HCW, this may include a lack of time or energy (Hollmeyer et al., 2009). For example, if a nurse feels that getting vaccinated would take too much time out of his/her busy schedule, then this may decrease his/her intention to receive the COVID-19 vaccine. This study will examine how self-efficacy is associated with intentions and behaviors among HCW receiving the COVID-19 vaccine.

Based on the problems identified above, the study will be informed by the Theory of Planned Behavior, which has been used in several health communication studies in the past (Conner et al., 2002; Norman et al., 1999; Fila & Smith, 2006; Wambach, 1997). The purpose of the theory is to predict what motivates individuals to engage in a given behavior. Its constructs lay out the relationship between attitudes, self-efficacy, subjective norms, intentions, and

behavior (Ajzen 1991). This theory is useful for studying the factors that influence intention to engage in a given behavior – in this case, vaccination. The purpose of this study is to examine what motivates HCW to receive the COVID-19 vaccine and what motivates their possible hesitancy to be vaccinated. This study will also look at how media and social media may influence their agreement or hesitancy to receive a vaccine.

Significance of the Study

COVID-19 has caused mass amounts of death and illness and has negatively impacted economies worldwide (Chan et al., 2020). Due to the urgency of controlling the spread of COVID-19, it is important to raise vaccination rates now that the COVID-19 vaccines have been released to the public. Health campaigns are an effective way to increase vaccination rates (De Juanes, 2007). One of the most important populations to target with communication efforts are HCW, who have shown a significant amount of hesitancy; like the general population, over 20% of HCW at a large multi-site U.S. academic medical center were unvaccinated as of May 2021 (Farah et al., 2022). Vaccination rates among HCW are important to focus on due to their status as frontline workers during the pandemic where they are exposed to the virus daily (Nguyen et al., 2020). This study will focus on what motivates HCW to receive the COVID-19 vaccine, as well as how online media may affect those intentions.

Previous studies have examined the intentions of HCW to receive other vaccines, like the influenza vaccine, but few have researched intentions to receive a COVID-19 vaccine among the public, let alone among HCW, which is partly because the COVID-19 virus is relatively newly discovered and has not allowed much time for studies to be conducted. Another factor that may influence intentions towards vaccination is online information on social media or other websites, which has not been studied much in terms of COVID-19, either. As social media and other

online content becomes ever more present in the lives of the public, including HCW, it is important to research how information spread online may contribute to intentions to get vaccinated.

From a communication perspective, gaining an informed approach of the best ways to reach HCW and what kinds of messages will be the most effective. It is valuable as well to gather data on the demographics of HCW to see if vaccination intentions vary based on gender, age, socioeconomic status, and other demographic categories. Health communication is proven to be more effective if researched properly and messages are tailored to the population it is trying to reach. For these reasons, the proposed study will be useful in gaining a better understanding of the communication issue behind HCW vaccination rates for COVID-19.

This study will also add to the body of existing knowledge about the Theory of Planned Behavior and what motivates audiences to get vaccinated, which will inform any future vaccination campaigns, not just for COVID-19. Other campaigns for routine vaccinations, like influenza, could use more data to tailor messages to audiences.

Chapter 2- Literature Review

This chapter is a review of literature related to the issue of COVID-19 vaccination intentions among healthcare workers. The review begins with a look at the history and importance of vaccines, then the history of resistance to vaccines. Next, the review moves onto HCW and their trends with vaccination. After this, the review covers health campaigns, along with their successes and failures. Lastly, the review covers the issue of the influence of social media on anti-vaccination attitudes.

History and Importance of Vaccines

Experts agree that among the many methods of human intervention, vaccines have made a great contribution to global health; a large and progressive decrease in mortality from infectious diseases began after the introduction of vaccines (Greenwood, 2014). A substantial body of evidence shows the numerous benefits of vaccines throughout history, starting with the global eradication of smallpox in 1979, which was made possible by the first vaccine to be deployed widely. The first breakthrough that made control of this disease possible was discovered by Edward Jenner in 1796, who created the first effective vaccine using cowpox (Strassburg, 1982). The eradication of smallpox proved to the world that human intervention in the field of public health was possible and could achieve positive results.

In the United States, routine immunization of children covers 16 vaccine-preventable diseases, including DTP (diphtheria, tetanus, pertussis), polio, MMR (measles, mumps, and rubella), Hib, hepatitis B, and varicella vaccines (CDC, 2021). In addition to the worldwide eradication of smallpox, this has resulted in the elimination of polio, measles, and rubella from the Americas, as well as preventing an estimated 14 million infections, 33,000 premature deaths,

and saving \$9.9 billion in direct medical costs and \$33 billion in indirect costs for each U.S. birth cohort that is fully vaccinated (Schuchat, 2011).

Advancements in medical technology have led to the development of vaccines to prevent infection of human papillomavirus (HPV), the most common sexually transmitted infection. Although mostly asymptomatic and harmless, low-risk types of HPV infection can result in common skin warts and high-risk types can cause cervical cancer and other anogenital cancers (CDC, 2021). Before the introduction of vaccines, an estimated 79 million persons were infected in the United States, which proved a need for a vaccine. After the introduction of the quadrivalent vaccine in the U.S. in 2006, the prevalence of HPV types 6, 11, 16, and 18 decreased 86% among females aged 14 through 19 years and decreased 71% among females aged 20 through 24 years; types 6 and 11 are responsible for more than 90% of cases of anogenital warts and types 16 and 18 together account for about 66% of cervical cancers, so this reduction is significant from an epidemiological standpoint (Drolet, 2015).

A recent example of a successfully fast-tracked vaccine occurred in response to the 2014 West Africa Ebola outbreak (Wolf et al., 2020). Ebola was first discovered in the Democratic Republic of the Congo in 1976 and has led to sporadic outbreaks of disease for 40 years, resulting in major loss of life and socioeconomic disruption. In early 2014, the most recent and devastating outbreak occurred in the West Africa region and was declared a Public Health Emergency of International Concern. This outbreak, which spanned 2014 to 2016, resulted in 28,000 infections and 11,300 deaths (WHO, 2016). Due to the urgency of the outbreak, clinical trials of experimental treatments and prophylactic vaccines were rapidly developed for clinical testing, made possible by funding from the Innovative Medicines Initiative Ebola+ program (EboVac, 2015). Typically, it takes 10 to 15 years for vaccines to be developed and approved,

but due to the increased need for an Ebola vaccine, the time spent moving the vaccine from Phase 1 trials to approval was cut down to five years (IFPMA, 2020).

Like the Ebola vaccine, the development of a vaccine for COVID-19 was fast-tracked in response to the global pandemic that began in the city of Wuhan in China's Hubei province in late 2019. The U.S. government partnered with pharmaceutical, biotech, and academic collaborators to quickly develop vaccines, and less than one year after the virus was identified, multiple vaccines received Emergency Use Authorization (EUA) from the U.S Food and Drug Administration (FDA) (FDA, 2022). The mRNA COVID-19 vaccine has been proven to have 95% efficacy in the prevention of COVID-19 infection in a multinational trial (Polack et al., 2020).

Vaccine Hesitancy

Despite the benefits of vaccines, there has been resistance to vaccination since its invention. In mid-nineteenth century England, compulsory vaccination against smallpox was instituted, which was part of the Vaccination Acts and Contagious Disease Acts. This legislation prioritized community health over natural individual rights to contract and spread disease. Certain groups of Victorian opinion campaigned against the Acts because they were viewed as infractions of liberty and medical tyranny (Porter & Porter, 1988). Another example of resistance comes from the United States in 1906, where anti-vaccination groups threatened to burn a schoolhouse, whip teachers, and punish school directors for enforcing the compulsory vaccination law (New York Times, 1906). This occurred after the Supreme Court ruled that a municipality or state could enact a law to protect the public against disease. Since then, smallpox has been eradicated throughout the developed and undeveloped world (Callender, 2016).

After increasing rates of uptake of the measles vaccine throughout the '70s and into the '80s, a new wave of vaccine resistance arose, spurred by anti-authoritarian social movements of the '60s and '70s for patients' rights, women's rights, and environmental protection. The same vocabulary and rhetoric used to argue for these movements were employed by parents to question childhood vaccination laws, who called for individuals to question institutions of authority and do their own research. Feminist activists began to encourage women to do the same, to take control of their health and bodies, and fight against patriarchal institutions and orthodox medicine (Conis, 2014).

The anti-vaccine attitudes popularized throughout the '60s and '70s appeared again in a more recent and high-profile example of vaccine resistance that occurred in the late 1990s and early 2000s after the publication of a paper in a prominent journal that falsely reported a link between autism and the measles, mumps, and rubella vaccine (Wakefield et al., 1998). The paper has since been retracted and denounced by the medical field and the CDC, but its effects have lasted. In 2008, the U.S. experienced the largest outbreak of measles since 2000, when the disease was said to have been eliminated, and the number of mumps and whooping cough cases also increased (Gross, 2009). Confusion and concern about the vaccine could have partly been exacerbated by the media, which reported that scientists were "split down the middle" over the vaccine's safety. Less than one in four people were aware that most of the evidence supported the safety of the vaccine (Dobson, 2003).

Vaccine opposition can be characterized by two primary concerns that have recurred throughout vaccine history: that vaccines cause more harm to people than the disease they are meant to protect against and that compulsory vaccinations infringe on individual rights (Schwartz, 2012). These concerns are still prevalent today; parents who worry about the safety of

vaccines contribute substantially to the under-immunization of children in the United States (Gust et al., 2004). Safety concerns are also prevalent since the COVID-19 vaccine has been made available (Puri et al., 2020).

Several factors unique to the situation surrounding COVID-19 may help to explain the skepticism of Americans, some of which are political factors. Data suggest that those who are politically conservative are more likely than those who are politically liberal to say they would refuse to get vaccinated, as well as to say they believe the pandemic is not a significant problem (Newport, 2020). Other factors include potential misconceptions about the nature of the scientific process and the development of the COVID-19 vaccine, and the breakdown of the distinction between experts and non-experts (Boyd, 2021).

Healthcare Workers and Vaccination

Vaccination of HCW is important for two main reasons: to protect the workers themselves and to indirectly protect elderly and/or immunocompromised hospital patients. Many outbreaks of influenza in healthcare facilities have been documented among these groups (Malavaud et al., 2001). To add to the issue, these groups of patients are not always able to be vaccinated, or the vaccine may not be as effective, due to their age or immunocompromised status when compared with younger adults (Gross et al., 1995). Patients in healthcare facilities where over 60% of the HCW were vaccinated experienced less influenza-related morbidity and mortality than the patients in facilities where HCW were not vaccinated (Potter et al., 1997). In addition, if HCW become ill, this results in possible labor shortages and disruption of health care at hospitals while the workers take time off to recover from illness (Pachucki et al., 1989).

However, even among the population of HCW, there is an issue with a lack of vaccine uptake. Contrary to what many may believe about vaccination rates among HCW, uptake isn't

necessarily high. For example, a study of hospital-based healthcare workers in the Netherlands found that only 37.6% of all respondents were vaccinated against influenza, and the group with the lowest rate of vaccination (29.6%) were nurses (Hopman et al., 2011). A considerable amount of HCW have either expressed concern about the COVID-19 vaccine or have refused to receive the COVID-19 vaccine, which is a cause for concern (Luo et al., 2021).

In a review of studies on the self-reported attitudes towards influenza vaccination that HCW hold, the authors found that if HCW choose to receive the influenza vaccine, they typically do so for their own benefit, rather than for the benefit of their patients. The typical HCW who chose to receive the vaccine trusted the vaccine's effectiveness, was older than other HCW who weren't vaccinated, and usually received the vaccine every year. Reasons for not receiving the vaccine among HCW included a range of misconceptions or lack of knowledge about influenza and its risk to patients and the safety and efficacy of the vaccines, in addition to a lack of convenient access to the vaccine (Hollmeyer et al., 2009). This information may apply to attitudes towards COVID-19 vaccination as well.

In the context of COVID-19, HCW are showing some hesitancy. A meta-analysis of cross-sectional studies confirmed that only about half of HCW (51%) were willing to receive a COVID-19 vaccine, and those who were willing were mostly male, aged 30 years or older, and had a history of prior influenza vaccination (Luo et al., 2021). In a study of American HCW, acceptance was found to be about 78%. Lower vaccination levels were found among women, nurses, and support staff (Farah et al. 2022).

Health Campaigns

Health campaigns are an important tool used to achieve a larger impact on public health by promoting certain behaviors, such as safer sex practices, health screenings, and safety

precautions (Anker et al., 2016). Campaigns are organized, communication-based interventions aimed at large groups of people that utilize social marketing to change behavior. Communication activities vary from campaign to campaign but may include posters, handouts, public service announcements, discussion groups, or forms of mass media (Snyder, 2007). There are proven benefits of incorporating mass media; health communication campaigns in the U.S. that utilize mass media have an average impact of about 5% in raising the prevalence of a targeted behavior. This means that if 50% of people were engaging in the target behavior before the campaign, then about 55% can be predicted to engage in the behavior after the campaign (Snyder & LaCroix, 2001).

Health campaigns typically go two different ways when trying to influence behavior; planners may decide to promote positive behaviors or prevent problematic ones. Prevention campaigns usually utilize fear appeals to bring attention to the negative consequences of a behavior, which is typically more effective in cases where harmful outcomes are significantly threatening, or where positive messaging is not compelling enough (Rice & Atkin, 2012, p. 8). Other important aspects of messaging include source credibility and trustworthiness, the level of engagement the messaging provides, how relevant the messaging is to the target audience, how easy the message is to understand, and how motivational the message is (p. 9).

A study of a hospital in Madrid, Spain, looked at the impact of a health promotion campaign designed to increase influenza vaccine coverage over three consecutive vaccination campaigns from 2001 to 2004 using passive messaging in the form of posters and updates to the hospital website messaging. Even though the overall vaccination rate after the three campaigns was only 41%, the rate progressively improved, from 15.9% in the first campaign and 21.4% in the second (De Juanes, 2007). This study provides an example of how specific health campaign

messages can be effective in a contained setting, such as a hospital, and gives an idea of how to possibly raise vaccination rates for COVID-19.

Other successful methods of vaccine promotion that contribute to increasing rates of vaccination include interpersonal strategies. A proven and strong predictor of vaccination, for a wide range of vaccines, is recommendation from health care providers (Ylitalo et al., 2013). When it comes to trust in health information sources, out of government health agencies, family and friends, charitable organizations, and religious leaders, Americans tend to trust doctors the most (Jackson et al., 2019). The kind of language used by HCW tends to influence vaccination as well; the use of presumptive, announcement-style language, like “today you’ll be getting your vaccine,” rather than conversational language, “how would you feel about getting a vaccine today?” leads to higher uptake (Brewer et al., 2017).

Another helpful tool used to promote vaccination is social media, given its wide reach and accessibility. Social media is quickly becoming an important source of information for individuals seeking more knowledge of vaccination and may help engage the public in an open conversation about the effectiveness of vaccines (Daley & Glanz, 2021). For example, a recent health campaign utilized influencers on social media to promote the influenza vaccine with vetted messages as well as original persuasive messages, which successfully resulted in increased positive attitudes toward the flu vaccine and decreased negative attitudes (Bonnievie et al., 2020).

Gaps in Health Communication

Despite the best interests of health campaign planners, sometimes campaigns end up ineffective. To make progress on future campaigns, it is important to examine what has gone wrong in the past and why it has gone wrong. One of the earliest examples of health campaigns

in the United States took place in the '60s, which was focused on raising rates of vaccination against measles. This began in 1962 when President John F. Kennedy signed the Vaccination Assistance Act, which directed federal funds to states to support immunization efforts (Conis, 2014). The Act resulted in success at first, but cases began to rise again, and it was made apparent that certain impoverished communities were not being protected, which was blamed on uneven support from Washington D.C. (Dandoy, 1967). Upper- and middle-class families were easily convinced that measles was important and worth vaccinating against, but families living in poverty had more pressing concerns and less access to the vaccines due to long lines at public health clinics and short hours. The idea that measles was just an accepted part of childhood was another barrier. It became apparent that other methods were needed to raise vaccination rates and convince the public of the importance of the measles vaccine (Conis, 2019).

Campaign developers face many issues when designing campaigns. One big reason for this is due to a failure to realize the limitations of health education; the relationship between health communication and behavior change is complicated and involves many interrelated factors. Education alone is not sufficient, and even HCW do not fully adopt the behaviors suggested by health education (Gill & Boylan, 2012). The complex relationship between communication and behavior change will likely be present in the context of a COVID-19 vaccination campaign. Therefore, it is important to focus on basing campaigns on theory, which offers the most promise in influencing behavior change when compared to campaigns not based on theory (Randolph & Viswanath, 2004).

The concept of health literacy can help to explain why there are gaps between health communication and measurable behavior change. The goal of health literacy is “the capacity to obtain, process, and understand” health-related information (Ratzan & Parker, 2000). Other goals

include the ability to navigate the health care system and to make informed decisions about medical care (Weiss, 2003). As the field of health continuously integrates newer technology to deliver health information, this brings a new level of skills required to fully understand how to adequately utilize health information (Berkman et al., 2010). With this comes disparities in health literacy across demographics; those who are more educated and have a higher income tend to have higher levels of health literacy than those who may only have a high school education and a lower income level, and those from lower socioeconomic groups also tend to have higher rates of health issues (Fleary & Ettienne, 2019). This makes it difficult to effectively communicate health information to the public at large, and the same is true for information about a COVID-19 vaccine.

Differences in culture and social groups also contribute to gaps in health communication. Different cultural groups respond differently to health messages, especially when language barriers come into play. For example, the state of California's "5-a-Day for Better Health! Campaign" sought to increase the population's consumption of fruits and vegetables to help prevent cancer and other diseases. After five years, knowledge significantly increased, but there was no measurable positive impact on the consumption of fruits – consumption even decreased substantially among the African American and Hispanic communities (Foerster et al., 1997). Especially among minority populations, a "one-size fits all" communication approach is not effective because these populations often have different family and community situations and may use different sources of information to access health communication (Pecchioni & Sparks, 2007).

The gaps mentioned above have come into play during communication about COVID-19, with the addition of some challenges unique to the issue. At the start of the pandemic, there was

an information overload about the virus, exacerbated by the fact that it was the first pandemic in history to happen since the widespread use of technology and social media (Pool et al., 2021). Once outbreaks started to spread to other countries outside of China, media coverage increased, and consumers of online news had access to nearly unlimited reports about the virus. While countries were trying to make decisions on stay-at-home orders, preventative measures like social distancing and mask-wearing, and treatments methods, it was difficult to fully explain the justifications behind policy measures, so confusion among the public rose (Vraga & Jacobsen, 2020). This shows that organizational messaging should be as simple and clear as possible to help alleviate confusion (CDC, 2009).

Misinformation and Social Media Influence

Sources that are spreading information, as well as misinformation, about the COVID-19 vaccine, are important to understand. Among these sources are anti-vaccine websites. Kata (2009) found these websites often appear in Google searches containing certain keywords, such as "harms of vaccines." The websites commonly state vaccines are unnecessary because diseases like smallpox are harmless with homeopathic treatment and promote beliefs that vaccines are poisonous and can lead to other diseases like sudden infant death syndrome or autism (Kata, 2009). According to Betsch et al. (2010), viewing these websites for just five to ten minutes influences negative perceptions of the risks of vaccines and decreases the likelihood a parent will vaccinate one's child. However, more research is needed to determine if the Internet searches themselves generate concern about vaccination, or if individuals who already have concerns about vaccinations are more likely to search for certain sources on the Internet (Dube et al., 2013).

Consuming and participating in online anti-vaccination media has very real consequences. Fox (2000) found that over half of those who visit online health websites believe almost all the health information they find online is credible, so due to the prevalence of anti-vaccination websites, it is likely a significant number of individuals will encounter and believe misinformation about vaccines. Public health websites should be as easy to find as possible so those who are less knowledgeable about vaccines will have access to reputable information (Betsch et al., 2012).

Social media has played an undeniable role in spreading anti-vaccination content and increasing vaccine hesitancy. For example, Schmidt et al. (2018) reported that “having access to any type of information in social media has been suggested as a potential influence on the growth of anti-vaccination groups.” Social media thus provides a platform for users to create content that has the potential to spread virally with no filter or review. In addition, Hoffman et al. (2019) report that false information appears to spread more rapidly than truth on social media. Given these findings, it is likely that social media will play a similar role for HCW who are skeptical and seeking information about the COVID-19 vaccine.

Partly due to its interactivity and ease of use, social media has become a prominent spreader of anti-vaccination sentiment. Hoffman et al. (2019) found that “educational material” that claimed to show the negative effects of vaccines was commonly posted in anti-vaccination Facebook groups, and these posts often suggested parents knew better about vaccines than physicians. The global nature of social media has allowed anti-vaccination groups to connect around the world, which has spread health misinformation in a way that was previously unfeasible (Hoffman et al., 2019). Social media plays a large role in how people receive and share vaccine information, especially because it allows for personal stories about the perceived

harms of vaccines to circulate widely. These stories are often emotional and compelling to those who may be hesitant about vaccinations (Betsch et al., 2012).

Anti-vaccination groups on social media, like Rage Against the Vaccines, are also quickly expanding. A study by Wadman showed that anti-vaccine pages on Facebook were more numerous and faster growing than pages that their counterparts, pages that promoted vaccines, like the Bill & Melinda Gates Foundation (2020). Anti-vaccination communication on social media can lead to organizing offline action as well; Wilson & Wiysonge found that the use of social media to organize offline action is highly predictive of vaccine-hesitant attitudes and the belief that vaccines are unsafe (2020). Both studies show reason for concern over anti-vaccination sentiment on social media.

Theory of Planned Behavior

The Theory of Planned Behavior was originally developed by Icek Ajzen in 1984. There are five main constructs of the theory: target behavior, intention, attitude towards the behavior, subjective norms, and perceived behavioral control. The theory states that intentions to perform certain behaviors can be predicted from attitudes toward the behavior, subjective norms, and perceived behavioral control. Subjective norms are described as perceived social pressure, and behavioral control is described as self-efficacy, or the person's confidence in their capabilities to perform the behavior. Typically, the more positive the attitude and the subjective norm, and the greater the perceived control, the stronger the person's intention to perform the behavior in question. When a person's intentions to perform a behavior are strong, it is assumed they will try to perform the behavior when the opportunity arises (Ajzen, 1991).

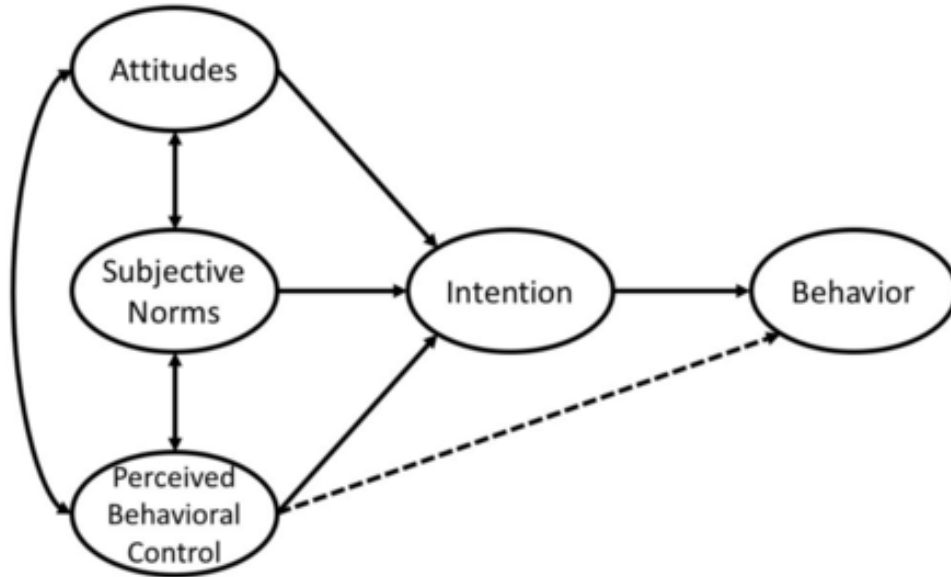


Figure 1: Theory of Planned Behavior (Ajzen, 1991)

Behavior:

The model starts with the definition of a behavior of interest. According to Ajzen, behavior is an “observable response in a given situation with respect to a given target” (2019). This behavior is defined in terms of its target, the action involved and the context in which it occurs, and the time frame; each of these elements is defined at varying levels of specificity. Examples of behaviors include drug use, consumer behavior, technology adoption, etc. (Ajzen 2020). This theory has been applied in numerous studies about health behaviors as well, like healthy eating and smoking cessation (Conner et al., 2002; Norman et al., 1999). The behavior that will be examined in this study is receiving a COVID-19 vaccine.

Intention:

The next construct is intention, which is the indication of a person’s readiness to engage in the defined behavior. Intention is based on both attitude toward the behavior and subjective norm, while it is moderated by perceived behavioral control (Hrubes et al., 2010). These intentions can be predicted with a high level of accuracy by examining attitude, subjective

norms, and perceived behavioral control; all these elements result in variance in behavior (Ajzen, 1991). Therefore, the stronger the intention, the more likely it is for a person to engage in a behavior. However, the degree to which an individual has actual control over behavior is largely determined by the individual's ability to overcome barriers such as insufficient time, money, or resources, among other factors. Hrubes et al. found that intentions to go hunting were strongly influenced by attitudes, subjective norms, and perceptions of behavioral control (2010). The intentions of HCW to receive a COVID-19 vaccine, along with what elements influence their intentions, will be examined in the current study.

Attitude:

As mentioned above, one of three constructs that contribute to behavioral intentions is attitude toward the behavior. Attitudes are shaped by an individual's beliefs about the consequences of the intended behavior, and whether performing the behavior of interest will lead to a certain outcome or provide a certain experience. For example, the belief that the Internet is a trustworthy channel for conducting personal business should lead to more positive attitudes toward the act of shopping online (George, 2004). In addition, a study by Asare confirmed that positive attitudes toward condom use contribute to the actual behavior of condom use and that negative attitudes contribute to decreased condom usage (2015). The current study will ask questions that measure the attitude that HCW have about receiving a COVID-19 vaccine to determine if, similarly to past studies, these attitudes affect vaccination behavior.

Subjective norm:

The second of the three constructs contributing to behavioral intentions is subjective norm. Subjective norm is described as the perceived social pressure to engage (or not to engage) in the selected behavior; it consists of an individual's beliefs about whether influential sources

think he or she should perform or not perform a behavior (Rhodes et al., 2002). This social pressure can come from friends, family, coworkers, spouses, physicians, supervisors, or any social entity that can approve or disapprove of performing the target behavior. A study of the eating habits of Native American youth found that subjective norms in the form of family, television, after-school programs, and friends were the best predictor of healthy eating behavior in boys (Fila & Smith, 2006). Subjective norms of HCW that will be investigated in this study that are commonly used with the TPB include friends and family, religious leaders, coworkers, and supervisors. The current study will add a media component, which is possibly an influential form of social pressure (Schmidt et al., 2018).

Perceived behavioral control:

Lastly, the third construct that influences behavioral intentions is perceived behavioral control, which is defined as the perception of one's ability to perform a given behavior, or self-efficacy. Included in this construct is the level of confidence an individual feels in his or her ability to overcome certain barriers to performing the behavior (Tolma et al., 2006). Applied to the breastfeeding behavior of new mothers, Wambach defined perceived behavioral control as the degree of anticipated ease or difficulty of breastfeeding and confidence in the ability to carry out breastfeeding plans (1997). In the current study, perceived behavioral control of HCW is defined as beliefs about sufficient time, ease of vaccination, and knowledge of where and when a vaccine can be acquired.

TPB and Vaccination

This theory can be used to predict an individual's intention to get vaccinated by examining the individual's attitudes toward vaccination, the norms (or social pressure) surrounding vaccination, and the individual's perceived behavioral control or confidence in their

ability to get vaccinated. For example, in a study conducted by Priest (2015), the TPB was used to predict the HPV vaccination intentions of male undergraduate college students using a questionnaire. Priest found that attitudes toward the behavior and subjective norm were significant predictors of behavioral intention, whereas perceived behavioral control was not. More recently, Wolff applied the theory to COVID-19 vaccination intentions. Results showed that among the 62% of participants surveyed who intended to get vaccinated, intentions were predicted by positive attitudes toward vaccination, subjective norms in favor of vaccination in one's family, perceived behavioral control, and anticipated regret (Wolff, 2021).

In summation, vaccines have a long history of opposition despite their widely agreed-upon benefits to public health. Today's challenges with increasing vaccine uptake include the spread of anti-vaccine content on social media and among social groups. Even HCW are not immune to vaccine hesitancy, which shows a need to understand their vaccine intentions. The Theory of Planned Behavior can help to predict vaccine intentions and understand the nature of social influence on vaccine decisions.

Hypotheses and Research Questions

A review of the literature has led to the hypotheses and research question below:

H1a: The more HCW use social media, the more negative their attitudes toward the COVID-19 vaccine will be.

H1b: Social media use is negatively associated with intention to receive the COVID-19 vaccine.

H1c: Social media use is negatively associated with perceived behavioral control over receiving the COVID-19 vaccine.

The present study will address the following research questions:

RQ1: What are the common reasons for hesitancy toward the COVID-19 vaccine?

RQ2: Were there differences between the TPB factors (subjective norms, perceived behavioral control, attitudes, and intentions) and decisions to receive the COVID-19 vaccine?

RQ3: Were there differences between reported reliance on subjective norms (like friends and family, media, religious leaders, coworkers, etc.) and HCW decisions to receive the COVID-19 vaccine?

RQ4: Were concerns about misinformation correlated with any study variables, and did these concerns differ depending on vaccine decision?

Chapter 3: Methodology

This study examined healthcare workers' social norms, perceived behavioral control, and attitudes that surround the COVID-19 vaccine, as well as how their media usage affected their intentions and decision to get vaccinated. To address the hypotheses and research questions, a web-based survey with an online questionnaire was employed. This chapter contains the research methods that were used in this study, variables with measurements, and the data analysis process.

Method

The sample was drawn from a population of American HCW. A convenience sampling method was used, which is a form of non-probability sampling where the researcher announces the study, and the participants self-select whether they want to participate. This form of sampling is subject to bias and is not generalizable to a target population but will be sufficient for an exploratory study given time and cost constraints (Stratton, 2021). The sample was drawn from HCW in the author's social circle and social media groups for HCW. The author asked participants to share the survey with other HCW to increase the sample.

The study was conducted using an online survey distributed to HCW after approval from the Institutional Review Board (IRB). An anonymous link to the survey questionnaire hosted by Qualtrics was shared with the participants. If the participants agreed to the online informed consent form, they continued to participate in the survey. Participants were eligible to participate if they currently lived in the U.S., worked in the healthcare field at any point in the last two years, and were at least 18 years of age. Two weeks after the survey was deployed, data collection stopped; the minimum response level was exceeded at 248 responses.

The participants were asked to complete a series of questions related to the Theory of Planned Behavior about their vaccination status and intentions to receive the COVID-19 vaccine,

attitudes towards receiving the COVID-19 vaccine, subjective norms, and perceived behavioral control. Additional questions were asked about health information sources and social media usage. The survey took less than 15 minutes. Statistical Package for the Social Sciences (SPSS) software was used to analyze the data collected from the survey. Analytical methods that were used included descriptives, correlations, and regression analyses.

Measurements

Survey questions were gathered from previous studies and modified to fit the objectives of the current study. Questions were grouped according to the constructs of the Theory of Planned Behavior (behavior, intention, attitudes, subjective norms, perceived behavioral control), social media and health information usage, and demographics. Demographic questions included information about age, job title, education, income, gender, ethnicity/race, area of residence, religion, and political leaning.

Intentions to receive the COVID-19 vaccine

Participants were asked three items about their intentions to receive the COVID-19 vaccine. One item, developed by the author, asked how many doses of the COVID-19 vaccine the participant had received. If the participant selected “I have not received any doses,” they were directed to three items adapted from Yang (2015) assessing intentions to receive the COVID-19 vaccine on 5-point Likert scales, for example: “If you haven’t received any dose of the COVID-19 vaccine, do you plan to get the COVID-19 vaccine this year?” To determine the reliability of these three items, a Cronbach alpha reliability test was performed. The scale was determined reliable at .804.

Vaccine decisions

Participants were asked four items about their decision to receive, or not to receive, doses of the COVID-19 vaccine. These items were developed by the author and based on concerns about the vaccine heard through social media and in-person conversation. The first item asked how many doses of the vaccine the participant had received. If the participant selected anything other than “I have received two doses as well as a booster,” they were sent to one of three other items corresponding with the number of doses they had received. These items asked participants to list all the reasons that kept them from receiving more doses, such as “Inconvenient to get more doses,” “Lack of trust in government/pharmaceutical companies,” “Had severe allergic reaction,” etc.

Attitudes toward the COVID-19 vaccine

Participants’ attitudes towards the COVID-19 vaccine were measured by 7 semantic differential scales that were adapted from Wolff (2021), and 6 items adapted from Ratnapradipa et al. (2017). Participants were asked to rate how they felt about receiving the COVID-19 vaccine on a scale of 1-5. Examples of the questions included: “To get vaccinated against COVID-19 is: ‘bad-good,’ ‘stupid-wise...’” Cronbach α of the semantic scales was calculated to be reliable with a score of .974. After throwing out one item, the remaining 5 items adapted from Ratnapradina had a Cronbach α of .715.

Subjective norms surrounding the COVID-19 vaccine

Nine items adapted from Wolff (2021) measured the subjective norms and social influence surrounding participants. Participants were asked to rate on a 5-point Likert scale how various social influencers felt about the participant receiving the COVID-19 vaccine: “What do your friends and closest family members think of you getting vaccinated against COVID-19?” The Cronbach α for these items was calculated at .859, which was deemed reliable.

Then, participants were asked to rate how much they rely on advice/input from a series of 17 sources of social influence on a 5-point Likert scale (friends and family, religious leaders, coworkers, supervisors, social media, and health websites, etc.). These sources of social influence were divided into two groups: interpersonal sources for vaccine advice, and media sources for vaccine advice. The Cronbach α for interpersonal sources, made up of eight items, was reliable at .841. The Cronbach α for media sources, made up of the remaining nine items, was also reliable at .814.

An additional six items included statements like “Most of my friends/family/coworkers/etc. have gotten a COVID-19 vaccine themselves” to measure how many of their subjective norms were vaccinated. Participants were asked to answer yes or no to these items. “Yes” was recoded as 1 and “No” was recoded as 0, and the sum of each respondent’s answers was calculated, with a max score of six.

Perceived behavioral control over receiving the COVID-19 vaccine

Four items were used to measure the amount of perceived behavioral control, or self-efficacy, participants had over getting a COVID-19 vaccine, adapted from Chu and Liu (2021). Participants were asked to rate how much they agreed with a series of statements about where and when to get the vaccine, if the vaccine was easy to get, and if they had the time to do so on 5-point Likert scales. Examples of the items included: “I know where to get a COVID-19 vaccine,” and “I know when I can get a COVID-19 vaccine.” The Cronbach α for these items was .760, which shows a reliable scale.

Health information sources

The participant’s usage of health information sources was evaluated through 17 items (other health professionals, social media groups and health information websites, etc.) adapted

from Wolff (2021). These items asked participants how much they relied on the sources on a 5-point Likert scale. These items were divided into three categories: interpersonal sources for vaccine information, media sources for vaccine information, and health professionals for vaccine information. The Cronbach α of each category was calculated to determine reliability. After throwing out one item, the score of the interpersonal items was raised to .776. The score for the media items was .740, and the score for the health professional items was .891.

Social media use

The participant's usage of nine different social media platforms (Instagram, Twitter, Facebook, YouTube, etc.) was evaluated by asking participants how often they used each platform for news and health information about the COVID-19 vaccine, adapted from Cozma and Chen (2012). This was measured by a 5-point Likert scale, from "never" to "all the time." Both scales were determined to be reliable; the Cronbach α score for social media use for news was .728, and the score for health information was .722.

Health misinformation

Respondents' perception of health misinformation was evaluated through seven items adapted from Zhang and Cozma (2022). These items asked participants how much they agreed with a series of statements related to health misinformation, such as "Health-related misinformation is a serious threat to this country," and "I have been exposed to health misinformation and believed it," etc. After throwing out one item to improve reliability, the Cronbach α of these items was determined to be .722.

Data analysis procedures

Analysis was performed using SPSS software. Initially, the data was cleaned and responses with many incomplete responses were removed, leaving 192 valid responses. Then,

variables were recoded, and reliability analyses were performed. Descriptives of the demographics, main variables, and reasons for vaccine hesitancy were examined.

After this, testing of the research questions and hypotheses began. SPSS was used to run bivariate correlations to determine the relationship between social media use and attitudes, intention, and perceived behavioral control. Next, a one-way ANOVA test was conducted to compare vaccine decisions with factors from the TPB, and a Tukey post hoc analysis was used to determine further differences. Lastly, an independent samples t-test was conducted to compare vaccine decisions with the influence of various subjective norms.

Chapter 4 – Results

This chapter details the findings based on the research questions and hypotheses that were formulated in the previous chapter. First, the descriptive results of demographic categories and study variables will be presented. After this, the data were analyzed to test the results of the hypotheses and research questions using a variety of methods.

Sample Characteristics

The survey was published on March 4, 2022, and data collection stopped after two weeks on March 18, 2022, with a total of 248 responses recorded. After cleaning the data, 192 responses were left for analysis. As shown in Table 1, the sample was predominantly female (89%, n=148), with 8% of respondents being male (n=13). The mean age of the sample was 41.7 (SD=12.8). Most respondents fell within the \$50,001 to \$75,000 income range (32%, n=53). Most respondents had a job title that was not listed in the survey and chose “Other” and specified their job title with a text box (43%, n=82). Popular responses that were listed under “other” included Certified Nursing Assistant (CNA), and Medical Assistant. About 35% of respondents chose Registered Nurse as their job title (n=67). In terms of education, most participants had either a 4-year degree (34%, n=57) or a professional degree (29%, n=48). The sample was also predominantly white (84%, n=140), and non-Hispanic (95%, n=158). In terms of political leaning, most respondents were either moderate (27%, n=45), or slightly conservative (21%, n=35). Lastly, over half of the respondents had received at least one dose of the COVID-19 vaccine (60%, n=115), with 40% unvaccinated (n=77).

Table 1. Demographics

	Characteristics	N (%)
Gender	Male	13 (8%)
	Female	148 (89%)
	Non-binary/third gender	1 (<1%)
	Prefer not to say	5 (3%)
Age (M=41.7, SD=12.8)	18-30	48 (25%)
	31-40	46 (24%)
	41-50	46 (24%)
	51-60	33 (17%)
	61 or older	19 (10%)
Income	Less than \$25,000	11 (6%)
	\$25,001 - \$50,000	26 (16 %)
	\$50,001 - \$75,000	53 (32%)
	\$75,001 - \$100,000	32 (19%)
	More than \$100,000	45 (27%)
Job Title	Doctor	9 (5%)
	Pharmacist	2 (1%)
	Nurse Practitioner	8 (4%)
	Physician Assistant	3 (2%)
	Physical Therapist	8 (4%)
	Technician	12 (6%)
	Phlebotomist	1 (<1%)
	Registered Nurse	67 (35%)
	Other	82 (43%)
Educational Level	High school graduate	3 (2%)
	Some college	16 (9%)
	2-year degree	9 (17%)
	4-year degree	57 (34%)
	Professional degree	48 (29%)
	Doctorate	15 (9%)

Race/Ethnicity	American Indian or Alaska Native	1 (1%)
	Asian	5 (3%)
	Black or African American Native	14 (8%)
	Hawaiian or other Pacific Islander	1 (1%)
	White	140 (84%)
	Other	6 (3%)
Hispanic, Latin, or Spanish origin?	Yes	9 (5%)
	No	158 (95%)
Political leaning	Very conservative	31 (19%)
	Slightly conservative	35 (21%)
	Moderate	45 (27%)
	Slightly liberal	26 (15%)
	Very liberal	13 (8%)
	Don't know	17 (10%)
Vaccinated for COVID-19?	Unvaccinated	77 (40%)
	Vaccinated	115 (60%)

Descriptives of Key Study Variables

The main variables examined in this study were related to constructs of the Theory of Planned Behavior (attitudes, subjective norms, perceived behavioral control, and intention).

Other variables include health misinformation influence, sources used for advice about the COVID-19 vaccine, sources used for information about the COVID-19 vaccine, and social media use for news and health information. See more information about these variables in Table 2.

Table 2: Descriptives of Key Study Variables

	Mean	Std. Dev	Cronbach α
Attitudes	2.40	1.07	.72
Subjective Norms (9 items)	3.59	.83	.86
Subjective norms (sum of 6 items)	4.64	1.50	-
Perceived Behavioral Control	4.84	.45	.76
Intention	1.07	.28	.80
Misinformation concerns	3.72	.82	.72
Sources for vaccine advice			
Interpersonal	3.64	.88	.84
Media	1.82	.77	.81
Sources for vaccine information			
Interpersonal	1.92	1.02	.78
Media	1.34	1.50	.74
Health professionals	2.43	.82	.89
Social media use for news	1.69	.61	.73
Social media use for health information	1.15	.28	.72

TPB-related variables. As Table 2 shows, attitudes towards the COVID-19 vaccine scored mostly neutral, leaning slightly towards the negative side (M=2.40, SD=1.07). Nine items, in the form of Likert scales, were used to measure subjective norms, or sources of influence, which tended to approve of the respondents getting vaccinated (M=3.59, SD=.83). Another six items were used to measure how many groups of the respondents' subjective norms had gotten vaccinated; the sum of these items (6 points available total) showed that most of these groups had received a vaccine (M=4.64, SD=1.50). The respondents' perceived behavioral control over getting the vaccine was high (M=4.84, SD=.45), which shows most knew when, where, and how they could receive a vaccine. Intention, which was only measured among respondents who had not received any doses of the vaccine, was low (M=1.07, SD=.28), which suggests those who have not gotten vaccinated yet have very little intention of doing so in the future.

Variables related to sources for vaccine advice and information. Respondents tended to agree that health-related misinformation was an issue (M=3.72, SD=.82). In terms of sources of advice or input for getting the COVID-19 vaccine, most respondents rated their reliance on interpersonal sources (which included health professionals and friends/family) (M=3.64, SD=.88) as higher than media sources (M=1.82, SD=.77). For sources of information about the vaccine, respondents rated their reliance on health professionals (M=2.43, SD=.82) as slightly higher than interpersonal sources (M=1.92, SD=1.02) or media sources (M=1.34, SD=1.50).

Variables related to social media use. Respondents reported their social media use for news as relatively low (M=1.69, SD=.61). Their reported use of social media for health information was lower than use for news (M=1.15, SD=.28).

Testing of Research Questions and Hypotheses

Intercorrelations of Study Variables

The correlation coefficients of each of the key study variables that were used to test research questions and hypotheses, including TPB concepts (attitudes, subjective norms, perceived behavioral control, and intention), health misinformation influence, sources used for advice about the COVID-19 vaccine, sources used for information about the COVID-19 vaccine, and social media use for news and health information, are depicted in Table 3.

Table 3: Bivariate Correlations of Study Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Attitudes	1												
2. Subjective Norms	.602**	1											
3. Perceived behavioral control	.110	.091	1										
4. Intention	.462**	.163	.044	1									
5. Misinformation concerns	.164*	.028	-.058	-.153	1								
6. Interpersonal - vaccine advice	.634**	.988**	.108	.155	.041	1							
7. Media - vaccine advice	.549**	.558**	.088	.194	.142	.571**	1						
8. Interpersonal – vaccine info	.114	.071	.013	.185	.071	.089	.379**	1					
9. Media - vaccine info	.000	.159*	-.044	.289*	.056	.159*	.505**	.374**	1				
10. Health prof. - vaccine info	.713	.535**	.111	.278*	.131	.556**	.730**	.332**	.212**	1			
11. Social media for news	.075	.118	-.205**	.291*	.178*	.109	.173*	.065	.086	.071	1		
12. Social media for health info	-.073	.064	-.052	.225	.070	.056	.226**	.155*	.392**	.084	.319**	1	
13. Vaccine decision	.634**	.521**	.058	-	.121	.550**	.436**	.138	-0.28	.606**	.083	-.013	1

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Social Media Use and Attitudes, Intention, and Perceived Behavioral Control

The first hypothesis was separated into three parts and predicted that the social media use of HCW would be negatively correlated with attitudes, intention, and perceived behavioral control. To test this hypothesis, a bivariate correlation was performed, which is shown in Table 3.

H1a was not supported, as there was no significant correlation between social media use and attitudes, which may mean that respondents had pre-existing attitudes about the vaccine that were not influenced by social media. It is important to note that social media use for news was particularly low ($M=1.69$, $SD=.61$), and social media use for health information was lower than use for news ($M=1.15$, $SD=.28$).

H1b was partially supported; a Pearson's Correlation was performed, and it was found that social media use for news was significantly and positively correlated with intention ($r=.291$, $p<.05$). Intentions among those who were unvaccinated were low ($M=1.07$, $SD=.28$), and so was social media use for news, as mentioned above.

Social media use for news was significantly and negatively correlated with perceived behavioral control, therefore H1c was supported, as shown by a Pearson's Correlation ($r=-.205$, $p<.01$). This suggests that the more likely HCW were to feel having control over getting vaccinated for COVID-19, the less likely they were to use social media for news.

Reasons for Vaccine Hesitancy

The first research question asked about common reasons for hesitancy among HCW to get vaccinated for COVID-19. All respondents who hadn't received all three recommended doses for the COVID-19 were asked questions related to why they hadn't gotten vaccinated. Respondents were allowed to choose multiple responses. Table 4 shows the response counts for

each category of vaccination: unvaccinated, one dose, and two doses/no booster.

Table 4: Reasons for Hesitancy

Reason	Unvaccinated (N=72)	One dose (N=6)	Two doses/no booster (N=35)
Medical reasons	8	-	-
Religious reasons	29	-	-
Lack of trust in government or pharmaceutical companies	93	2	15
Worried about safety	53	1	9
Too new/waiting for more info	44	2	10
Developed too fast	33	3	6
Don't feel at risk	43	2	13
Allergic reaction to previous dose	-	2	1
Made me feel sick	-	1	7
Inconvenient to get booster	-	-	4
Other	17	5	19

As shown in Table 4, the most common reason for vaccine hesitancy among those who were unvaccinated, as well as those who had only received two doses, was lack of trust in the government and pharmaceutical companies (N=108). Among the unvaccinated respondents, other popular reasons included worries about the safety of ingredients in the vaccine (N=53), followed by the vaccine being too new (N=44), and not feeling at risk of getting seriously ill from COVID-19 (N=43). Those who chose “other” were asked to detail their reason in a text box. Several responses included variations of the following, detailing how the respondent felt their natural immunity from recovering from COVID-19 infections was more effective than the vaccine:

“Had Covid 19 Delta and Omicron... natural immunity”

“I believe in natural immunity. I had covid with multiple symptoms in Feb 2021.”

One participant listed their pregnancy and breastfeeding as a reason to refuse vaccination. Other respondents expanded on their hesitance due to the newness of mRNA technology:

“Initially I was waiting to see results & observe for possible side effects, due to new mRNA technology. Then I began to see death rate & widespread serious adverse effects on CDC/VAERS website.”

“There are preventatives available and I am not a Guinea pig.”

“Lack of long-term studies related to the benefits and risk of a new vaccine technology.”

Differences Between TPB Factors and Vaccine Decisions

The second research question asked if there were differences between TPB factors (subjective norms, perceived behavioral control, attitude, intentions) and HCW decisions to receive a COVID-19 vaccine. To answer this research question, a one-way ANOVA test was conducted to compare vaccine decisions (unvaccinated, one dose, two doses, or two doses plus booster) with the factors listed above. Results showed there were significant differences in vaccine decisions between subjective norms [$F(3, 169) = 30.97, p < .001$] and attitudes [$F(3, 160) = 82.67, p < .001$], as shown in Table 5. No significant differences were found between vaccine decisions and the other factors.

Table 5: Differences between Subjective Norm, Attitudes, and Vaccine Decision

Variable	Number of doses	N	Mean	SD	Differences between groups	Result
Subjective norm	No doses	69	3.06	.83	No doses with two doses**	<.001
	One dose	6	3.31	.42	One dose with fully vaccinated*	.017
	Two doses	34	3.60	.73	Two doses with fully vaccinated**	<.001
	Fully vaccinated	64	4.17	.61	Fully vaccinated with no doses**	<.001
	ANOVA results					[F (3, 169) = 30.97, p<.001]
Attitudes	No doses	77	1.68	.43	No doses with two doses**	<.001
	One dose	9	1.80	.77	One dose with fully vaccinated**	<.001
	Two doses	37	2.29	.98	Two doses with fully vaccinated**	<.001
	Fully vaccinated	69	3.43	.74	Fully vaccinated with no doses**	<.001
	ANOVA results					[F (3, 160) = 82.67, p<.001]

** . Significant at the 0.01 level

* . Significant at the 0.05 level

A Tukey post hoc analysis, as shown in Table 5, found that the mean value of subjective norms ($M=3.59$, $SD=.83$) was significantly different between those who were unvaccinated ($M=3.06$, $SD=.71$) and those who had received only two doses ($M=3.60$, $SD=.73$). The mean value of subjective norms was also significantly different between those who were fully vaccinated ($M=4.17$, $SD=.61$) and all over vaccine options; unvaccinated, only two doses, and only one dose ($M=3.31$, $SD=.42$).

This analysis also found that the mean value of attitudes ($M=2.40$, $SD=1.07$) was significantly different between those who were unvaccinated ($M=1.58$, $SD=.43$) and those who had received only two doses ($M=2.29$, $SD=.98$). The mean value of attitudes was also significantly different between those who were fully vaccinated ($M=3.43$, $SD=.74$) and all other vaccine decision options; unvaccinated, only two doses, and only one dose ($M=1.80$, $SD=.77$).

Taken together, these results show that reliance on subjective norms was reported to be higher among those who decided to get fully vaccinated than among those who were not fully vaccinated or unvaccinated. Those who were fully vaccinated also tended to have more positive attitudes towards the vaccine than those who were not fully vaccinated or unvaccinated. This suggests that more positive attitudes tend to result in higher rates of vaccination.

Differences Between Reliance on Subjective Norms and Vaccine Decisions

The third research question asked about the differences between reliance on subjective norms and HCW decisions to receive the COVID-19 vaccine. To answer this, an independent samples t-test was conducted to compare vaccine decisions (unvaccinated or vaccinated) with the reported reliance on various subjective norms. There was a significant difference in overall reliance on subjective norms between the vaccinated and the unvaccinated groups $t(182) = -8.26$, $p < .001$. This suggests that those who decided to get a COVID-19 vaccine had higher rates of

vaccination among their subjective norms ($M=5.3$, $SD=.96$) compared to those who were unvaccinated ($M=3.67$, $SD=1.67$). There was a significant difference in the scores for reliance on vaccine advice from media sources between the vaccinated and unvaccinated groups; $t(171)=-6.33$, $p<.001$. This shows that those who were vaccinated may rely more on vaccine advice from the media ($M=2.09$, $SD=.76$) than those who were unvaccinated ($M=1.41$, $SD=.59$). There was also a significant difference in the scores for vaccine information from other health professionals between the vaccinated and unvaccinated groups; $t(169)=9.89$, $p<.001$. This suggests that those who are vaccinated tend to rely more on information from other health professionals about the vaccine ($M=2.98$, $SD=1.01$) than those who were unvaccinated ($M=1.62$, $SD=.65$).

Concerns about Misinformation

The fourth and final research question asked what variables were correlated with concerns about misinformation and if there were differences in concern between the vaccinated and unvaccinated groups. As shown in Table 3, misinformation concerns were positively and significantly correlated with attitudes ($r=.164$, $p<.05$) and social media use for news ($r=.178$, $p<.05$). This suggests that HCW with more positive attitudes towards the COVID-19 vaccine, and HCW who reported higher social media use for news, had higher concerns about misinformation in the media.

To further examine this question, an independent samples t-test was used to compare the concerns about misinformation between the unvaccinated and vaccinated groups. There was a significant difference between the vaccinated and unvaccinated groups $t(167)=-1.57$, $p<.05$. This suggests that those who are vaccinated have slightly higher concerns about misinformation ($M=3.80$, $SD=.73$) than those who are unvaccinated ($M=3.60$, $SD=.94$).

Chapter 5 – Discussion, Implications, and Conclusion

This chapter covers discussion of the hypotheses and research questions, theoretical and practical implications of the results of the study, limitations, and suggestions for research in the future, and lastly, conclusions.

Discussion

The main objective of this study was to examine the factors that come into play when HCW are making COVID-19 vaccine decisions, such as attitudes, sources of social influence, and self-efficacy. Nearly half of the respondents were unvaccinated, which brings an important perspective to the research, as those who are hesitant about the vaccine are the most important to understand. This data provided valuable insight into the factors that motivated those HCW to refuse a COVID-19 vaccine.

The first hypothesis, which was divided into three parts, investigated how social media use was correlated with attitudes, intentions, and perceived behavioral control, and predicted that social media use would be negatively correlated with all these factors. This sample reported their social media use for both news and health information as relatively low, with use for news being slightly higher than for health information. When examining the relationship between attitudes and social media, there was no correlation found, which suggests that HCW attitudes are not influenced by their social media use but may be influenced more by other factors instead. H1b was partially supported as it found a weak but significant positive correlation between social media use for news and intention. Intention to vaccinate was only measured among unvaccinated respondents; intention was very low, which suggests those who are unvaccinated have very little intention to get vaccinated in the future. This result may mean that unvaccinated HCW who use

social media for news more than their peers have slightly higher intentions to get vaccinated in the future. H1c was supported; a weak negative correlation between social media use for news and perceived behavioral control was found, which suggests that increased feelings of control over getting vaccinated for COVID-19 were linked with lower social media use for news.

Other correlations were found with social media use; social media use for health information was weakly and positively correlated with reliance on media for information about the COVID-19 vaccine, as well as reliance on the media for vaccine advice, which may mean HCW who find the media to be a reliable source of information and advice for the vaccine were more likely to use social media as a source of health information. It was also found that interpersonal and media sources for vaccine advice were strongly correlated with attitudes, which suggests that the more HCW relied on their social groups and the media for vaccine advice, the more positive attitudes they had toward the COVID-19 vaccine; this makes sense, as the vaccinated groups showed higher reliance on their social groups and the media.

The first research question examined the most common reasons for hesitancy among HCW. The most popular response was a lack of trust in government or pharmaceutical companies, followed by concerns about the safety of the ingredients in the vaccine, and the vaccine being too new. These results were not surprising, as these concerns have been prevalent throughout history (Gust et al., 2004; Porter & Porter, 1988) and have been mentioned in other studies about the COVID-19 vaccine (Boyd, 2021). Most of the top concerns are related to worries about the novelty of the COVID-19 vaccine. Similar concerns have been raised with new vaccines in the past, namely the HPV vaccine. When it was made available to the public, parents initially had concerns about its safety, whether it had been thoroughly tested, and if there would be serious side effects. Concerns about government intrusion into private life were prevalent as

well (Katz et al. 2009). These results prove that the concerns for COVID-19 are not new to the world of vaccines and that HCW are similar to the rest of the public regarding vaccine concerns. It is important to not make assumptions that working in healthcare leads to total acceptance.

The second research question asked about the differences between TPB factors and vaccine decisions. It was found that the reported reliance on subjective norms was the highest among those who were fully vaccinated and got progressively lower with the fewer doses HCW received, with the lowest level of reliance reported among the unvaccinated. This suggests that HCW who feel pressured by the social groups they are surrounded by are more likely to receive more doses of the COVID-19 vaccine than those who feel like they are less influenced by their social groups. Similarly, it was found that attitudes were the most positive among those who were fully vaccinated and got progressively lower with the fewer doses HCW received, with the most negative attitudes reported among those who were unvaccinated. This is not necessarily surprising and is consistent with the Theory of Planned Behavior because it shows that more positive attitudes lead to an increased likelihood of engaging in vaccination.

The third research question asked about the differences in reliance on subjective norms and the vaccine decisions of HCW. Consistent with the findings from RQ2, it was found that those who had higher rates of vaccination among their social groups overall were more likely to be vaccinated themselves, which shows that subjective norms are influential in general, consistent with the TPB. It was also discovered that those who were vaccinated were slightly more likely to rely on media sources for vaccine advice than those who were unvaccinated. Vaccinated individuals were also more likely to rely on vaccine information from other health professionals than individuals who weren't vaccinated. This suggests that vaccinated individuals

were more influenced by the media and by their health professional peers than individuals who weren't vaccinated.

The fourth research question asked about concerns about misinformation, and if it was correlated with any study variables or if it differed depending on vaccine decision. It was discovered that there was a significant, but very weak, positive correlation between social media use for news and misinformation influence, which suggests that those who use social media for news more thought that health misinformation was more of an issue. Concern about misinformation was also weakly and positively correlated with attitudes towards the COVID-19 vaccine, which suggests that those who have more positive feelings about the vaccine are also more concerned about misinformation. This result is not surprising, as those who are vaccinated (and thus have more positive attitudes about the vaccine) are significantly more concerned about misinformation.

Theoretical Implications

This study applied the Theory of Planned Behavior to understand the motivating factors behind HCW getting vaccinated for COVID-19. The constructs of the TPB – attitudes, subjective norms, perceived behavioral control, intentions, and behavior - were examined in this study. This theory has been commonly used to explain what motivates individuals to engage in health behaviors (Conner et al., 2002; Norman et al., 1999) including vaccination (Priest, 2015), and more recently vaccination for COVID-19 (Wolff, 2021). Due to the novelty of COVID-19, there haven't been many studies conducted that have applied the TPB to COVID-19 vaccination, and even less studying it in the context of HCW, therefore this study provides useful insight into this issue and expands the existing body of knowledge on the TPB. The present study also added a

media use component to the subjective norms construct to understand how social media sources may impact vaccine decisions.

This study confirmed most of the TPB constructs, but not all. The TPB states that positive attitudes are linked to higher intentions, and negative attitudes lead to less intention (Ajzen, 1991). Intentions in the present study were strongly correlated with attitudes, as shown in Table 3, which is consistent with Wolff's study (2021). The intentions construct was only correlated with attitudes in this study, but because intentions were only measured among those who were unvaccinated and thus were quite low, that may explain the lack of correlation among other constructs. The findings about intention show that those who still haven't received a vaccine at this point have very little intention to do so in the future, which highlights an area of concern.

When looking at vaccine decisions, which is synonymous with the TPB behavior construct, a bivariate correlation found it is significantly and positively correlated with attitudes and subjective norms, which shows that more positive attitudes and higher influence from subjective norms led to an increased instance of the behavior: getting vaccinated for COVID-19. In addition, ANOVA tests and t-tests found differences in attitudes and subjective norms between the vaccinated and unvaccinated groups. However, behavior was not correlated with perceived behavioral control in this study.

Practical Implications

The findings from this study present several implications for health campaigns and communication about the COVID-19 vaccine to HCW, as well as for the public. It provides insight into a demographic that is especially important to understand, as HCW are tasked with

administering and providing information about the COVID-19 vaccine. Communication specialists can utilize the findings of this study when designing messaging to better target HCW by increasing their understanding of where HCW receive their information and what factors motivate their decisions.

A main takeaway from this study was that HCW who have not gotten any doses of the COVID-19 vaccine at this point have very little intention of getting any doses in the future, which poses a challenge to communication efforts. Everett Rogers' Diffusion of Innovation Theory can help to explain why this is; there will usually be a percentage of individuals in the "laggard" category who are less susceptible to social pressure, are much more skeptical about the innovation and its outcomes, and take much longer to process information and weigh pros and cons of new technology (Dearing, 2018). This proves the need for messaging that is tailored to the unique motivating factors for those who are unvaccinated, but also the need to focus on those who have some intention of getting vaccinated in the future so they can be pushed to the next step.

When compared with vaccinated respondents, findings showed that the unvaccinated respondents reported lower reliance on subjective norms overall, had lower rates of vaccination among their subjective norms and relied less on the media and other health professionals for vaccine advice. Conversely, the more HCW relied on their social groups and the media for vaccine advice, the more positive attitudes they had toward the COVID-19 vaccine. When considering that those who are unvaccinated have low intentions to get vaccinated in the future, these results imply that unvaccinated HCW are a difficult group to reach and are set in their beliefs, as it seems they are less trusting of the media, their social groups and fellow HCW for advice about getting the vaccine. However, it was shown that unvaccinated HCW relied slightly

more on vaccine information from other health professionals than on vaccine information from the media, which implies that messaging from other health professionals may be more effective at increasing vaccination rates among HCW than from other sources.

When comparing those who were unvaccinated and those who had received at least some doses of the vaccine, there were some key differences, which highlight promising areas to target with messaging. Those who had two doses and no booster were significantly more influenced by their subjective norms and have more positive attitudes about the vaccine than those who were unvaccinated. These findings imply that it may be more useful to target messaging to those who are hesitant and maybe on the fence about future doses than those who are still unvaccinated at this point. Differences were also found between the two groups' concerns about misinformation; those who are vaccinated are slightly more concerned about misinformation in the media than those who aren't vaccinated.

Surprisingly, the findings from this study indicated that social media use was low among HCW and did not seem to influence attitudes, especially since most respondents of this survey were Facebook users. This implies that attitudes about the vaccine are more influenced by other factors. However, among the unvaccinated respondents, results showed that HCW who used social media for news more had slightly higher intentions to get vaccinated in their future when compared to their unvaccinated peers. This implies that social media could be a useful area to target for messaging about COVID-19 vaccine news.

Limitations and Future Research

There are some limitations of the current study that are important to make note of, the first being that this was a convenience sample, and is thus not generalizable. Respondents were

limitedly recruited from anti-vaccination Facebook groups and from the author's social network, which implies some bias. The demographic makeup of this study skewed mostly female, white, and was mostly made up of registered nurses. There was not much diversity in terms of gender and race/ethnicity. The study was also based on an anonymous online survey, so there is potential for respondents to lie or click through responses quickly to get done faster. A study that includes a more representative sample would be useful in the future.

Future research efforts should be targeted at HCW who have received only one or two doses, as this group seems to be more receptive than those who are unvaccinated. What kinds of social media messaging and messaging from other health professionals are the most effective at increasing positive attitudes about the vaccine would be useful to research in the future as well.

Conclusion

Despite the benefits of the COVID-19 vaccine, it remains a divisive issue among certain populations, even HCW - who may be assumed to be universally approving of vaccines. A significant amount of HCW have shown hesitancy towards the COVID-19 vaccine. This proves the importance of understanding what influences their vaccine decisions. The objective of this study was to apply the Theory of Planned Behavior to understand what factors motivate HCW to receive or refuse the COVID-19 vaccine: attitudes, subjective norms, self-efficacy, and intentions. The study also examined how media and social media play a part in their decisions, which is becoming an increasingly more prevalent source of information about health information.

Results from this study upheld most constructs of the TPB and provided insight into the media usage of HCW. It also revealed reasons why HCW may be hesitant about getting a

COVID-19 vaccine, which will help to inform communication efforts in the future. The results concluded that unvaccinated HCW have negative attitudes about the COVID-19 vaccine, and are less trusting of the media, their social groups, and fellow HCW for advice about getting the vaccine. Unvaccinated HCW are a difficult demographic to target, so a better understanding of what motivates their decisions, and the decisions of those who have had at least some doses, will prove to be useful in future health campaigns.

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Appendix A- Survey Questionnaire

Dear Participant:

This survey is being conducted by a graduate student in A.Q. Miller School of Journalism and Mass Communications at Kansas State University as part of a master's thesis. The purpose of this study is to gather information about your social media usage and your intentions or decision to receive the COVID-19 vaccine. The study has been approved by the Institutional Review Board at Kansas State University (IRB#11047).

The survey will take about 10-15 minutes and you will be asked questions related to COVID-19 vaccine, social media usage, and a few demographic questions. Your responses are anonymous, and your identity will be kept confidential. Any publications that come from this project will not contain any identifying information. The study has no anticipated risks, and your participation is completely voluntary. However, should you feel any discomfort, you may discontinue and withdraw your consent at any time without penalty.

TERMS OF PARTICIPATION: I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty, or loss of benefits, to which I may otherwise be entitled. By clicking the “continue” button below, it is a confirmation that I have read and understand this consent information, and willingly agree to participate in this study under the terms described. Clicking “exit” means that I do not consent and will not participate in the survey.

- Proceed
- Exit survey

1. How old are you? (if under 18, sent to exit message)
2. Do you live in the United States? (if no, sent to exit message)
 - a) Yes
 - b) no
3. Have you worked in the healthcare field at any point in the past two years? (if no, sent to exit message)
 - a) Yes
 - b) No

Exit message

Unfortunately, you do not meet the requirements of this survey. Thank you for your time.

Job title

4. What is your job title?
 - a) Doctor
 - b) Pharmacist
 - c) Nurse Practitioner
 - d) Registered Nurse
 - e) Physician Assistant
 - f) Physical Therapist
 - g) Dentist
 - h) Dental hygienist
 - i) Optometrist
 - j) Technician
 - k) Phlebotomist

l) Other (specify)_____

Intentions to receive COVID-19 vaccine

5. How many doses of the COVID-19 vaccine have you received?
- a) I have not received any doses (skip to 8)
 - b) I have received only one dose (skip to 6)
 - c) I have received only two doses (skip to 7)
 - d) I have received two doses as well as a booster
6. If you only received one dose of the COVID-19 vaccine, what kept you from receiving more? (check all that apply)
- a) Inconvenient to get more
 - b) First dose made me feel sick
 - c) Lack of trust in government
 - d) Lack of trust in pharmaceutical companies
 - e) Worried about safety of ingredients in vaccine
 - f) Had severe allergic reaction
 - g) Vaccine is too new; waiting for more information
 - h) Vaccine was developed too fast
 - i) Don't feel at risk of getting seriously sick from COVID-19
 - j) If your reason wasn't listed above, tell us a little about it: _____
7. If you only received two doses of the COVID-19 vaccine, what kept you from receiving the booster? (check all that apply)
- a) Inconvenient to get a booster
 - b) First two doses made me feel sick

- c) Lack of trust in government
 - d) Lack of trust in pharmaceutical companies
 - e) Worried about safety of ingredients in vaccine
 - f) Had severe allergic reaction
 - g) Vaccine is too new; waiting for more information
 - h) Vaccine was developed too fast
 - i) Don't feel at risk of getting seriously sick from COVID-19
 - j) If your reason wasn't listed above, tell us a little about it: _____
8. If you didn't get the COVID-19 vaccine, what kept you from doing so? (check all that apply)
- a) Can't receive for medical reasons
 - b) Can't receive for religious reasons
 - c) Lack of trust in government
 - d) Lack of trust in pharmaceutical companies
 - e) Worried about safety of ingredients in vaccine
 - f) Vaccine is too new; waiting for more information
 - g) Vaccine was developed too fast
 - h) Don't feel at risk of getting seriously sick from COVID-19
 - i) If your reason wasn't listed above, tell us a little about it: _____
9. Rate how much you agree with the following statements on a scale of 1 to 5
(1=absolutely not, 5=definitely)
- a) Do you plan to get the COVID-19 vaccine this year?
 - b) Do you plan to get the COVID-19 vaccine sometime in the future?

10. If you were given an opportunity to get the COVID-19 vaccine, how likely is it that you would? (rank from 1=not likely at all, 5=very likely)

Attitudes

11. To get vaccinated against COVID-19 is: (7 semantic differentials)

- a) Bad – good
- b) Stupid – wise
- c) Dangerous – safe
- d) Useless – effective
- e) Unpleasant – pleasant
- f) Irresponsible – responsible
- g) Disturbing – reassuring

12. Rank how much you agree with the following statements from 1 to 5 (1=absolutely not, 5=definitely)

- a) The COVID-19 vaccine will keep me from getting sick
- b) The COVID-19 vaccine will keep me from spreading COVID-19 to my friends and family
- c) The COVID-19 vaccine has a lot of side effects
- d) People get sicker from the COVID-19 vaccine than COVID-19
- e) I trust health care providers when they say the COVID-19 vaccine is safe
- f) I trust public health authorities when they say the COVID-19 vaccine is safe

Subjective Norms

13. What do the following groups think of you getting vaccinated against COVID-19? (rate from 1=very much against it to 5=very much for it)

- a) Friends
- b) Family
- c) Physicians
- d) Pharmacists
- e) Nurses
- f) Religious leaders
- g) Coworkers
- h) Supervisors
- i) Social media groups

14. Most of my friends have gotten a COVID-19 vaccine themselves. (yes or no)

15. Most of my family members have gotten a COVID-19 vaccine themselves. (yes or no)

16. Most of my coworkers have gotten a COVID-19 vaccine themselves. (yes or no)

17. Most of my supervisors have gotten a COVID-19 vaccine themselves. (yes or no)

18. Most of the medical professionals I know have gotten a COVID-19 vaccine themselves.

(yes or no)

19. Most of the users I follow on social media have gotten a COVID-19 vaccine themselves.

(yes or no)

20. How much would you say you rely on advice or input about getting the COVID-19 vaccine from the following sources? (rate from 1=not at all to 5=very much)

- a) Friends
- b) Family
- c) Physicians
- d) Pharmacists

- e) Nurses
- f) Religious leaders
- g) Coworkers
- h) Supervisors
- i) Social media
- j) County health officials
- k) National health officials (CDC)
- l) International health officials (WHO)
- m) Health websites
- n) Newspapers
- o) TV
- p) Radio
- q) Podcasts

Perceived Behavioral Control

21. Rate how much you agree or disagree with the following statements on a scale of 1 to 5

(1=strongly disagree, 5=strongly agree):

- a) I know where to get a COVID-19 vaccine
- b) I know when I can get a COVID-19 vaccine
- c) The COVID-19 vaccine is easy to get
- d) I have time to get a COVID-19 vaccine

Health information sources

22. How much would you say you rely on the following for information about the COVID-19 vaccine? (rate from 1=not at all to 5=very much)Family

- a) Physicians
- b) Pharmacists
- c) Nurses
- d) Religious leaders
- e) Coworkers
- f) Supervisors
- g) Social media
- h) County health officials
- i) National health officials (CDC)
- j) International health officials (WHO)
- k) Health websites
- l) Newspapers
- m) TV
- n) Radio
- o) Podcasts

Social media use

23. How often do you use the following social media platforms for news? (rate from 1=never

to 5=all the time)

- a) Instagram
- b) Twitter
- c) Facebook
- d) YouTube
- e) Tumblr

- f) Tik Tok
- g) Reddit
- h) LinkedIn
- i) Snapchat
- j) Other (specify) _____

24. In your opinion, how much do you rely on the following sources for health information about the COVID-19 vaccine? (rate from 1=never to 5=all the time)

- a) Instagram
- b) Twitter
- c) Facebook
- d) YouTube
- e) TikTok
- f) Reddit
- g) LinkedIn
- h) Snapchat
- i) Other (specify) _____

Health misinformation

25. Rate how much you agree with the following statements from 1 to 5 (1=absolutely not, 5=definitely)

- a) Health-related misinformation is a serious threat to this country
- b) I have been exposed to health misinformation and believed it
- c) Others have been exposed to health misinformation and believed it
- d) Health misinformation can change people's attitudes about an issue

- e) The mainstream media, such as CNN, the New York Times, and broadcast television are leading sources of health misinformation
- f) Health misinformation can be stopped by large tech companies
- g) Social media, such as Twitter, Facebook and, Instagram are leading sources of health misinformation

Demographics

26. What is the highest level of education you have completed?

- a) Less than high school
- b) High school graduate
- c) Some college
- d) 2-year degree
- e) 4-year degree
- f) Professional degree
- g) Doctorate

27. What is your income?

- a) Less than \$25,000
- b) \$25,001 - \$50,000
- c) \$50,001 - \$75,000
- d) \$75,001 - \$100,000
- e) More than \$100,000

28. What is your gender?

- a) Male
- b) Female

- c) Non-binary / third gender
 - d) Prefer not to say
29. Are you of Hispanic, Latino, or Spanish origin?
- e) Yes
 - f) No
30. How would you describe yourself? (choose all that apply)
- a) American Indian or Alaska Native
 - b) Asian
 - c) Black or African American
 - d) Native Hawaiian or other Pacific Islander
 - e) White
 - f) Other (specify) _____
31. Which option best describes the area you live in?
- a) Urban
 - b) Suburban
 - c) Rural
32. What is your religious affiliation?
- a) Christian
 - b) Muslim
 - c) Jewish
 - d) Buddhist
 - e) Hindu
 - f) Unaffiliated

- g) Atheist
- h) Agnostic
- i) Nothing in particular
- j) Don't know
- k) Other (specify) _____

33. What is your political leaning?

- a) Very conservative
- b) Slightly conservative
- c) Moderate
- d) Slightly liberal
- e) Very liberal
- f) Don't know

Debrief: Thank you for your participation. Your responses have been collected and your data will remain anonymous. If you have any questions, please contact principal investigator Dr. Nancy Muturi at 785-532-6890 (nmuturi@ksu.edu) or Piper Brandt at 620-437-7944 (pnbrandt@ksu.edu). This survey is approved by Institutional Review Board protocol #11047. A copy of the thesis will be accessible through KREX at <https://krex.k-state.edu/dspace/>

Questions or concerns about your rights as a research participant may be directed to Dr. Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, 785-532-3224

TO: Nancy Muturi
Journalism & Mass Comm
Manhattan, KS 66506

Proposal Number: IRB-11047

FROM: Rick Scheidt, Chair
Committee on Research Involving Human Subjects

DATE: 02/23/2022

RE: Proposal Entitled, "PREDICTING COVID-19 VACCINATION INTENTIONS WITH THE THEORY OF PLANNED BEHAVIOR: A SURVEY OF HEALTHCARE WORKERS."

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written - and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §104(d), category: Exempt Category 2 Subsection ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

Electronically signed by Rick Scheidt on 02/23/2022 12:02 PM ET