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**Attitudes Towards COVID-19 Vaccination:  
Literature Review and Attitudes of Individuals Who Delayed Vaccination**

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### **Abstract**

This thesis examines attitudes towards and ethics of receiving one of the fastest vaccines ever developed—the COVID-19 vaccine. The Food and Drug Administrations (FDA) in the U.S. has granted either Emergency Use Authorization or full approval to three vaccines: the Pfizer-BioNTech, Johnson & Johnson, and Moderna-NIAID vaccines. However, although the FDA approved and the Center for Disease Control and Prevention (CDC) recommends getting the vaccines, that does not necessarily mean people have an ethical responsibility or a positive attitude towards getting vaccinated against COVID-19; this current paper explores both of these ideas as related to COVID-19 vaccination. First, it surveys sources highlighting the utility of vaccines to control infectious diseases and pandemics. Next, it questions whether getting vaccinated against any disease, and specifically COVID-19, is the ethical action to take. Then, there is a literature review of research into attitudes towards the COVID-19 vaccine, determining the most prevalent attitudes across all people and within specific demographics such as women, people belonging to certain political and religious groups, racial and ethnic minorities, and children. Finally, the results of a study conducted at DePauw University to investigate attitudes, attitude changes, and motivations of recently vaccinated individuals are reported in order to elucidate certain factors that may be useful to understand vaccine decision making.

## Introduction

Over the past year and a half the world has been overwhelmed by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which causes coronavirus disease 2019 (COVID-19). The virus emerged in late 2019, became a global threat in early 2020, and has precipitated a global pandemic costing over five million lives worldwide at the time of this writing (World Health Organization, 2021). The pandemic is a dynamic situation, with multiple waves of infection, such as the recent spread of the more contagious and dominant Delta variant in the U.S. (CDC, 2021b). Not only has COVID-19 led to considerable amounts of national and global disease and death, but the substantial behavioral changes that have been used to slow the spread of disease, including lockdowns, have had grave consequences on economic sectors and the health and well-being of people (Savulescu, 2020).

Given the considerable impact that COVID-19 has had on society, the pressure and incentive for companies to develop a COVID-19 vaccine was very high. It is known that public health behavioral and hygienic control measures such as handwashing, masking, and social distancing can help prevent infectious diseases through reduced contact and transmission (Pogue et al., 2020; Savulescu, 2020). However, vaccinations developed against SARS-CoV-2 are viewed as one of the most promising ways of providing a permanent solution to control the COVID-19 pandemic (Pogue et al., 2020). Over the past century, vaccinations have become an integral measure used to reduce and eradicate or nearly eradicate certain viral illnesses. Vaccines not only provide individuals who receive them with direct immunity against disease, but they also reduce infections among unvaccinated individuals through herd immunity (Fisher et al., 2020). Herd immunity is defined as indirect protection of the overall community that occurs once

a sufficiently high enough number of people are inoculated against a certain disease to ensure that there is then a low or nonexistent risk of the disease spreading among those who remain susceptible (Dubé et al., 2013; van den Hoven, 2012).

One major barrier to herd immunity that has slowed the rate of COVID-19 vaccination is the phenomenon of vaccine hesitancy— defined as a delay in acceptance or the refusal of vaccines in spite of the availability of vaccination programs— which has been in the spotlight in recent years due to its threat to vaccination behaviors (Salmon et al., 2015). The historical basis of many health and vaccination concerns seems to suggest that if we can find a way to directly address these concerns and target groups of people who may be hesitant, we could boost vaccine confidence for COVID-19 vaccines and other vaccines as well (McAteer et al., 2020; Salmon et al., 2015; Schwartz, 2012). For example, anti-vaccination attitudes and vaccine hesitancy has existed since the 19th century with the Anti-Vaccination Society of America being established shortly following the first vaccine. However, while the general resistance to vaccination may be rooted in the past, new modes of communication allow for the various ways to advocate for vaccination such as the promotion of positive vaccination stories and data from scientists, health officials, and advocates (Schwartz, 2012).

Nonetheless, it is also important to acknowledge that the specific context surrounding the ongoing COVID-19 pandemic highlights both structural issues and new phenomena that might affect attitudes towards the vaccine. Overall, working to understand specific attitudes that individuals and groups have towards the COVID-19 vaccine is important because they will encapsulate both timeworn patterns in hesitancy and any novel factors as well. Additionally, studying attitudes is necessary because in order to reach herd immunity, a large majority of

people will need to feel comfortable enough with the vaccine to receive it. Within the dynamic situation of both vaccination progress and the path of COVID-19 itself, many variables will influence individual attitudes toward the vaccine and the act of receiving it. As more people receive the vaccine or the pandemic worsens, normalization might influence some people's negative attitudes and intentions to get the vaccine while others might not be easily swayed.

In order to investigate specific vaccine attitudes and advocate for vaccination, I plan to integrate current research and historical influences on COVID-19 vaccination attitudes. I begin by examining vaccination and herd immunity in a general sense and through an ethical lens. Then, I examine current studies of peoples' attitudes towards the COVID-19 vaccine as well as historical attitudes towards healthcare and vaccination<sup>1</sup>. Finally, I report the results of a study conducted at DePauw University in order to investigate attitudes of more recently vaccinated individuals to analyze if an attitude change or outside motivating factor influenced their decision to receive the vaccine.

### **Vaccination as a Measure to Control the COVID-19 Pandemic**

Although the COVID-19 pandemic has inflicted significant harm on the lives, health and economy of many nations and their people, the vaccines developed against the SARS-CoV-2 virus offered one of the first real weapons against the disease and its spread (Pogue et al., 2020). While many people are anxious about the fact that the COVID-19 vaccines only began being developed at the onset of the pandemic, the technology of vaccines and the science behind them has been around for a long time. In fact, as early as 1798 Edward Jenner suggested that cowpox

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<sup>1</sup> Given the ongoing and ever-developing nature of the COVID-19 pandemic and research, this current paper only represents a snapshot into attitudes seen during the time of review. Additionally, most of the sources used to investigate attitudes reported research done in 2020 as more recently published material focuses more on vaccine uptake and specifically on hesitancy.

be used to inoculate people against the smallpox disease, a technique which spread rapidly around the world at the beginning of the 19th century (Lombard et al., 2007). Since then, science and research have expanded the capabilities of vaccines and vaccine technologies, making them a central topic in pandemic preparedness management (Ward et al., 2020). Specifically for the COVID-19 pandemic, ensuring both a high and equitable vaccination coverage has been cited as a promising method to prevent the spread of the disease and bring an end to the pandemic (Nguyen et al., 2021).

Vaccines and vaccination programs have two primary methods by which they prevent disease and support public health. The first and most immediate effect of vaccines is that they provide direct immunity and prevent disease for the specific individuals who receive them. Also, there is a secondary effect by which vaccines reduce infections among unvaccinated individuals and groups through herd immunity (Fisher et al., 2020). Herd immunity can be achieved when individuals acquire either natural immunity— which develops following infection with the actual disease— or vaccine-induced immunity (CDC, 2017). Since there has been limited data on the length of natural immunity that develops following COVID-19 infection and because the disease is so deadly in many populations, the preferred way to attain herd immunity for COVID-19 is via vaccination with the approved vaccines. However, even without reaching herd immunity, there are still community benefits from the greatest number of people getting vaccinated as possible. For example, there have been estimates that increasing influenza vaccination coverage by five percent could have prevented anywhere from 4,000 to 11,000 hospitalizations in the 2017-2018 flu season. With COVID-19, these benefits from increased vaccination coverage may come in

the form of reduced COVID-19-related hospitalizations, less strain on hospital capacity, and fewer deaths (Fisher et al., 2020)<sup>2</sup>.

While it is reassuring to know that even without reaching herd immunity hospitals may be less strained and there may be fewer deaths, herd immunity is still the goal that public health and government officials aim to reach. However, without a known percentage of people who need to be vaccinated in order to reach herd immunity and with a constantly fluctuating group of vaccine hesitant individuals, reaching herd immunity against COVID-19 will be complicated. As of late 2020, the percentage of U.S. residents who need to be vaccinated to achieve herd protection was not defined because the number “depends on vaccine effectiveness, patterns of population mixing, vaccination patterns, and the basic reproduction number” of the coronavirus (Fisher et al., 2020, p. 6). Based on an estimate of the basic reproduction number as 3.32 and assuming perfect effectiveness of a vaccine—which the Pfizer-BioNTech and Moderna vaccines approach—it had been estimated that at least 70% of the population needed to be vaccinated to attain herd immunity (Fisher et al., 2020). Regardless of whether this number gives the correct estimate to attain herd immunity, the highly contagious Delta variant and fluctuating surges of cases, hospitalizations, and deaths should encourage even more individuals to be vaccinated to protect themselves from the disease (CDC, 2021b; Times, 2020). However, aside from the question of whether individuals should get vaccinated for their own health, it is also possible to examine if individuals have an ethical responsibility to themselves and to others to become vaccinated against COVID-19.

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<sup>2</sup> Even as the U.S. approaches herd immunity, the surge in cases, hospitalizations, and deaths caused by the now dominant Delta variant contradict this prediction (CDC, 2021b). However, it is important to note that vaccination status is still offering increased primary protection to vaccinated individuals (Scobie et al., 2021).

### **Ethical Considerations for COVID-19 Vaccination**

Given that vaccination is an action which influences both the person getting vaccinated and the lives of others, it is appropriate to approach the decision with an ethical framework.

There is a considerable amount of ethical research and perspectives that have been generated and modified to address the question of vaccination in general as well as COVID-19 vaccination specifically. In his book *Ethics of Vaccination*, Alberto Giubilini has designed and advocated for an ethical scheme which can easily be applied to the COVID-19 vaccine. Giubilini begins by describing that ethical responsibilities can exist at either the individual, collective, or institutional levels, and vaccination ethics are no exception to this general trend. However, while all three of these levels are important, sometimes it is possible for autonomy—the ability to make one’s own decisions—to conflict with the individual’s own best interest or the best interest of public health in general. In other words, although autonomy generally holds strong ethical weight, the autonomous decision to not get vaccinated might harm an individual or their community. Nonetheless, when making a decision, each person must weigh how the probability of adverse side effects from the vaccine compares with the probability of lethal consequences from acquiring the disease (Giubilini, 2019). For COVID-19 this is particularly interesting because younger people are less likely to die from the disease, yet they are simultaneously more likely to have influenza-like symptoms from receiving the vaccine.

Giubilini continues to explain that since getting vaccinated is a positive duty, it is slightly more difficult to justify a moral obligation to take action. However, considering that getting vaccinated for COVID-19 is easy and costless, failing to take action is similar to a moral violation of a negative duty, or the requirement to not act to protect others. Overall, he claims

that achieving herd immunity is a collective obligation— as opposed to an individual obligation— that allows the collective of people to protect those who are unable to get vaccinated. This aggregate collective responsibility requires through the *fairness principle* that individuals who are neither immunosuppressed, allergic to the vaccine, nor too young to be vaccinated have a fairness-based moral obligation to contribute to herd immunity. This fairness principle requires that each person who is eligible and able to be vaccinated must do so in order to distribute the benefits and costs effectively (Giubilini, 2019). This principle and ethical requirement to get vaccinated holds true for all vaccines from childhood vaccinations to the COVID-19 vaccine.

Additionally, there has been so much work done on the study of vaccine ethics that scholars have also written about the particular ethics of choosing not to get vaccinated; according to many scholars, this choice leads to the impermissible act of simply *free riding* with the herd immunity created (Giubilini et al., 2018; Navin, 2013; van den Hoven, 2012). Free riders are defined as “people [who] deliberately decide not to be immunized and benefit from the herd’s protection” (van den Hoven, 2012, p. 154). Since individuals who exhibit this behavior take advantage of the collective good without contributing themselves, it is morally unjustified. However, there are some scholars who argue that individuals who refuse vaccination should not be considered free riders for two reasons (Bradley & Navin, 2021). Their first claim is that the free rider model misrepresents subjective motivations of vaccine refusers who legitimately doubt the benefits and overstate the risks associated with vaccination. In other words, since vaccine refusers do not think they are refusing to make a valuable contribution to a public good, these scholars argue that they are not free riding (Bradley & Navin, 2021). On the other hand though,

it has been argued that it is irrelevant whether individuals desire to or believe that they benefit from the collective good—herd immunity in this case—because they do still benefit without fairly contributing (Navin, 2013; van den Hoven, 2012).

The second argument against vaccine-related free riding is that a *true* free rider benefits from a good that they could *also* be contributing to. In the case of vaccination, it is argued that people cannot both contribute to and benefit from herd immunity because once they are vaccinated, they have primary protection and no longer benefit from the herd immunity (Bradley & Navin, 2021). Although this argument may hold true in some cases, with COVID-19 and the existence of breakthrough cases, especially with the Delta Variant, it is inaccurate. While breakthrough cases are much less common, they do still exist (Scobie et al., 2021). Therefore, a vaccinated individual who contributes to the herd immunity could benefit from protection against a breakthrough case of COVID-19 once community spread is lowered by herd immunity. While this is all hypothetical given that most communities in the U.S. have not reached herd immunity yet, it shows that the argument that vaccine refusers are not free riding is logically flawed. Since they benefit from others' decisions to be vaccinated, would not be harmed themselves by participating, and have a moral obligation to fairly contribute to the good, it is unethical for a person to free ride when it comes to vaccination (van den Hoven, 2012).

Consequently, free riding to receive the benefits from herd immunity for COVID-19 is also intrinsically unethical. This ethical principle holds true for people who claim religious and anthroposophist reasons for noncompliance as well as those who do not wish to be vaccinated simply because they wish to prevent possible negative side effects; all of them would be unethically free riding by not getting vaccinated against COVID-19 (van den Hoven, 2012).

However, while this standpoint seems pretty strict and straightforward, accusing someone of free riding with the COVID-19 herd immunity and making the precise ethical debate just outlined is polarizing and not likely to be effective (van den Hoven, 2012). Instead, what would be a more constructive approach to encourage vaccination is to focus on understanding specific attitudes toward the COVID-19 vaccine and use that data to address specific concerns and stressors.

Knowing that this method has worked in the past for other public health and safety measures, there are many studies that have been done to assess attitudes towards COVID-19 vaccination.

These studies have found both general trends in attitudes as well as demographic factors that were influential predictors of attitudes.

### **Attitudes Towards COVID-19 Vaccination**

Before examining or influencing attitudes towards the COVID-19 vaccine, it is important to first define attitudes and understand how individuals form them towards people, objects, and activities in their daily lives. Psychologists and sociologists approach attitudes in distinct ways, and therefore they have different definitions of the term *attitude*. From a psychological perspective, attitudes are personal “dispositions to respond with some degree of favorableness or unfavorableness to a psychological object” (Ajzen & Gilbert Cote, 2011, p. 289). However, given that these dispositions are constructs within the human mind that are impossible to directly measure, sociologists find it more useful to define attitudes as the prescriptive or evaluative judgements that emerge from these constructs (Voas, 2014). Whether the attitude is the disposition or the measurable judgement that results, it is useful to understand how attitudes form and interact with beliefs, feelings, and behaviors.

Rather than the attitudes being innate, it is generally accepted that individuals acquire positive and negative attitudes, which are influenced by the people's social background and experiences (Ajzen & Gilbert Cote, 2011; Olson & Kendrick, 2011). Therefore, people who have different upbringings— which are heavily influenced by different cultures or positions within a social structure — will most likely develop unique attitudes towards the same ideas and objects. One predominant theory which delineates the origins of attitudes upholds that attitudes can form on the basis of emotion or affect, beliefs or cognition, or past behaviors (Olson & Kendrick, 2011; Voas, 2014). In other words, people's emotional states, personal beliefs, or prior actions can influence their judgement towards the person or entity in question. Applying this theory specifically to the COVID-19 vaccine, it is possible that emotions, beliefs, and behaviors toward COVID-19 in general, local or national responses, prior vaccinations, and more can all influence an individual's attitude toward the vaccine or the act of getting vaccinated against COVID-19.

Furthermore, attitudes may be formed as a result of direct observation, they may be self-generated, or they may be formed indirectly by accepting information from outside sources such as friends, television, newspapers, and books (Ajzen & Gilbert Cote, 2011). While all these ways of attitude formation might apply to COVID-19 vaccine attitudes, the direct observation is especially important as people witness their friends and family receive the vaccine and see celebrities and influencers get vaccinated. Vaccine ads as well as personally posted information and misinformation that is shared on social media may also be an influential way by which COVID-19 attitudes are affected by the indirect acceptance of information.

Although there are a variety of motivating factors for studying attitudes towards the COVID-19 vaccination, many stand out in particular such as the notion that attitudes may

influence behavior. If this correlation was true for attitudes about the COVID-19 vaccine, it would be especially useful because scientists and government officials need to analyze how difficult it will be to reach herd immunity in order to determine strategies to promote vaccination. To evaluate the predictive power of COVID-19 vaccination attitude, it is important to know that it is categorized as an *attitude toward a behavior*. Meta analyses of the ability of *attitudes toward a behavior* to predict the corresponding behavior have identified a positive correlation between the prediction and the actual behavior. In fact, it has been shown that when the relationship between the attitude and behaviors are assessed at compatible levels of specificity or generality, there is a greater predictive capability (Ajzen & Gilbert Cote, 2011). In other words, directly asking people about their attitudes towards COVID vaccination and vaccines may correlate with actual behaviors and outcomes of the vaccination.

However, one must also recognize that attitudes do not always correlate with or predict behavior. Disjunctions between attitudes and behaviors can occur for a variety of reasons such as some attitudes being merely descriptive or the existence of various motivating factors that affect actions. By the late 1960s, there was mounting evidence that attitudes were only weakly related to behavior; this fact may lead many people to wonder why researchers should still study attitudes at all (Voas, 2014). However, regardless of whether attitudes actually predict behaviors it is still interesting to study them on the basis of how they reflect the socialization and cultural influence on certain individuals or groups. Additionally, attitudes encompass a cognitive processing that is fascinating to study and can also influence how other people form attitudes, think, or behave. Therefore, while it is possible that COVID-19 attitude might not correlate directly with uptake behavior, this research still represents valuable data. Before delineating the

various attitudes expressed in the research, it is important to highlight that the studies of COVID-19 vaccination attitudes reported below each take a slightly different approach to collecting data. The result is an agglomeration of data that is multifaceted and captures the overall sense of why individuals may be hesitant or refuse to take the vaccine.

### **Fears About Safety and Possible Side Effects**

By far the attitude that has been reported most frequently in the studies of COVID-19 vaccination attitudes, intent, and behaviors has been a concern about the safety of the vaccine (Fisher et al., 2020; Nguyen et al., 2021; Paul et al., 2021; Pogue et al., 2020). More specifically, the safety concern is normally in some way related to the fear of possible side effects of the vaccine, whether they be short-term effects and symptoms or long-term effects that arise later after an individual has been vaccinated against SARS-CoV-2.

Some of the more typical attitude studies found clear evidence for safety and side effect concerns as predictors of negative attitudes toward vaccinating against COVID-19. Nguyen et al. found that in the United States, 29.8% of adults surveyed in December who did not intend to get vaccinated cited concerns about side effects and safety of the vaccine (2021). Fisher et al. found that a lower percentage (25.3%) of participants espoused a specific concern about the vaccine—side effects and safety being one of them— as their reason for intending *not* to get the COVID vaccine. Interestingly, out of individuals who were *unsure* about getting the vaccine in the same study, 34% of them specifically cited safety and side effects as their reason for hesitancy (Fisher et al., 2020). This suggests that people who are unsure about vaccination, or vaccine hesitant, are more likely to be driven by a fear of a lack of safety than those who are against the COVID vaccine. Some specific quotes that researchers gathered related to safety include “I would

question the safety of the vaccination and the possible side effects,” and “Vaccines can be harmful” (Fisher et al., 2020, p. 13). These two quotes in particular are interesting because the first represents anxiety specifically about the COVID-19 vaccine, whereas the latter quote seems more strongly against vaccination.

Additional studies have taken a more nuanced approach to the question of attitudes related to safety. In the United Kingdom, Paul et al. were able to predict risk for uncertainty and a lack of intent to vaccinate against COVID-19 based on negative attitudes towards vaccines in general. They found that worries about unforeseen effects of vaccination predicted a five times higher likelihood of being unwilling to get a COVID-19 vaccine (Paul et al., 2021). Pogue et al. has found that when given a free response question, 51.85% of survey respondents said that concerns about the safety or side effects were their biggest fear related to the COVID-19 vaccine. In addition to this, the same study found that a majority (63.47%) of participants either agreed or somewhat agreed with the statement “I am worried about the side effects of the vaccine for myself” and that 39.31% agreed or partially agreed that “The side effects of the vaccine are likely to be worse than COVID-19 itself” (Pogue et al., 2020, p. 6). While it is slightly alarming that the majority of people would agree with the first statement, worrying about the side effects does not necessarily prevent someone from getting the vaccine. However, believing that the vaccine side effects would be worse than COVID-19 itself provides a much larger barrier to vaccination in individuals who take this stance. This reasoning is linked to the phenomenon of omission bias— the preference for harm caused by omission rather than harm caused by commission (Jamison et al., 2020). In other words, if a negative outcome is perceived to be

likely, people would rather remain inactive and experience harm as opposed to being harmed through taking action.

### ***Women and Attitudes Towards Safety***

One finding that is particularly interesting related to attitudes towards COVID-19 vaccination is that numerous studies have found that women were more likely than men to show non-intent towards receiving the vaccine, mostly due to fears related to safety and side effects (Callaghan et al., 2021; Khubchandani et al., 2021; Nguyen et al., 2021). One study found that women are more likely to express concerns specifically about the unforeseen side effects of vaccines in general (Paul et al., 2021). However, women also are more likely to practice preventative behaviors such as getting an influenza vaccine and wearing face masks to avoid COVID-19 infections. Therefore, this suggests that while women expressed more negative attitudes about the vaccine than men, it may not be because they do not wish to partake in the preventative benefits of the vaccine. Rather, they may have viewed getting vaccinated as too large of a safety risk to be worth the reward<sup>3</sup> (Khubchandani et al., 2021).

Specific fears regarding the COVID-19 vaccine that women have reported in mainstream and social media platforms are its effects on pregnancy, fertility, and menstrual cycles. These fears and hesitations have encouraged the CDC to create a whole webpage report about what is known about these topics. There is a lot of information from the CDC that emphasizes that the vaccine has not been related to pregnancy or fertility complications and that it is still recommended that women get the vaccine regardless of their current or future reproduction plans. However, the CDC also reiterates that not much data has been compiled on this topic yet

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<sup>3</sup> According to Khubchandani et al., the conflicting results for vaccine hesitancy in women merits further investigation (2021). Also, these studies represent attitudes towards the vaccine before much safety data was known about the vaccine, so it is possible that women's uptake rates are higher than their attitudes might suggest.

(CDC, 2021a). While for many women misinformation of a direct link to fertility or pregnancy loss makes them hesitant, it is possible that the lack of proof against those complications is enough to make other women have a hesitant attitude towards vaccination.

Another interesting observation that seems to be related to women's hesitancy is a tendency to avoid COVID-19 vaccination to a greater extent when there are children in the home. It is unclear what the specific thought processes leading to these attitudes are, but one study in the U.S. reported that women, and even some men, have a 34% higher likelihood of refusing the COVID-19 vaccine if they have children at home (Khubchandani et al., 2021). Women's desire to avoid possible negative side effects of the vaccine for the sake of their children is likely related to a longstanding protectionist attitude of women who are often held responsible for safeguarding the health of others. Hopefully through additional research and discussions, vaccine hesitant women feel more comfortable being vaccinated against COVID-19 so they can contribute to herd immunity and protect their families that way.

### **Anti-Vaccination or Vaccine Hesitant Attitude in General**

Research into COVID-19 vaccine attitudes has found that although there are certainly new concerns with the COVID-19 vaccine, some people report not wanting to be vaccinated because of generalized and pre-existing anti-vaccination attitudes. Although fully anti-vaccination individuals exhibit one extreme of the continuum of vaccine attitudes, many others employ anti-vaccination attitudes and ideas to a more limited extent (Dubé et al., 2013). Additionally, anti-vaccination attitudes are sometimes characterized as a belief system or emotional response to vaccination rather than a distinct perspective (Fisher et al., 2020). Because of this characteristic of the anti-vax mentality, influencing these emotionally-founded belief

systems may be one of the greatest challenges to face when attempting to reach herd immunity for COVID-19 .

Although anti-vaxers represent a more extreme or distinct form of vaccine skeptics, the growth of vaccine hesitancy in general is enough to indicate that uncertain or negative attitudes towards vaccination have been influential in the past several years. In fact, before the COVID-19 pandemic, the World Health Organization had previously categorized vaccine hesitancy as one of the top ten global health threats facing the world (Khubchandani et al., 2021). According to McAteer, “skepticism about vaccines is a timeworn concept with shifting ideologies that reflect historical events and individual belief systems” (2020, p. 703). Indeed, values found to be associated with vaccine hesitancy are purity, liberty, and anti-authority values (McAteer et al., 2020). Finally, it is important to note that trust in institutions that produce vaccines or public agencies that promote them was already reported as low in 2015 (Salmon et al., 2015). Therefore, with additional politicization of other COVID-19 mitigation strategies and the fact that some people see COVID guidelines as an attack on freedom, this could cultivate a stronger anti-authority stance related to anti-vaccination attitudes (Wood & Schulman, 2021).

Indeed, there is evidence of anti-vaccination attitudes being the driving force for some people’s negative attitudes towards the COVID-19 vaccination (Fisher et al., 2020; Olagoke et al., 2021; Ward et al., 2020). One study completed in France found that 27.6% of participants who intended to refuse the COVID-19 vaccine used the reason of being against vaccination in general to support their decision (Ward et al., 2020). Additionally, in the United States, Fisher et al. found that among individuals who answered no when asked if they intended to be vaccinated against COVID-19, a majority of 56.6% cited anti-vaccination attitudes, beliefs, or emotions as

their reasoning (2020). Of these respondents, many indicated that they did not like, want, or believe in vaccines while others specifically referenced scientifically inaccurate information such as associating vaccines with autism or that it is impossible to vaccinate against a virus (Fisher et al., 2020).

There was also a trend shown in studies that suggests that perhaps past behaviors with flu and other vaccines can be used as a predictor of anti-vax or vaccine hesitant attitudes, which then affect COVID-19 vaccine acceptance (Paul et al., 2021; Pogue et al., 2020). Many of the specific quotes that Fisher et al. gathered make reference to the flu vaccine and its lower rate of effectiveness, or they mention that they had a specific bad experience with the flu vaccine (2020). One study found that vaccine history and routine vaccination were the most important predictors of intent to receive the COVID-19 vaccine (Pogue et al., 2020). Also, the opposite behavioral trend has been observed— that people who do not regularly receive vaccines are also less likely to intend to get the COVID-19 vaccine. One study found that people who did not receive the flu vaccine last year were more than twice as likely to be unsure about a COVID-19 vaccine and 3.4 times more likely to have decided against the vaccine altogether (Paul et al., 2021). Taken as a whole, these anti-vaccination attitudes and behaviors— which correlate with past experiences with and exposure to vaccination— are most likely going to be some of the hardest to combat when trying to reach herd immunity for COVID-19 and other communicable diseases.

### ***Religiosity Predicts Greater Vaccine Refusal***

Given that religious exemptions have historically been provided for vaccinations in the U.S.— thereby allowing people to use their religious beliefs to refuse vaccination— it is not

surprising that people who express religious beliefs have a higher likelihood of COVID-19 vaccine refusal (Callaghan et al., 2021; LeFever, 2005; Olagoke et al., 2021). In general, individuals with high levels of religiosity, the quality of being religious, have a greater likelihood of holding negative views toward scientific innovations in general and thus a greater possibility of spreading misinformation (Olagoke et al., 2021). Although there are a variety of mechanisms through which religion could influence negative attitudes towards vaccines, some examples include religious doctrines that have been interpreted to be against vaccination, teachings from religious leaders, and the development of the vaccine using materials that the religion does not support, such as human embryos or pork products. A common religious interpretation that may be applied to matters of health is that the Creator has it in their plan to either infect or protect certain humans from disease, and people cannot influence their fates. An example of this thinking as related to COVID-19 was provided when Fisher et al. asked respondents to provide a reason for responding “no” to intending to be vaccinated against COVID-19; one individual responded “God protects His children for viruses,” equating religiosity itself with protection (2020, p. 13). Although only six percent of respondents who expressed anti-vaccination beliefs in the Fisher study cited religion as their main reason, other studies included religiosity as an independent variable and found that it has a significant impact on COVID-19 vaccine attitudes (Callaghan et al., 2021; Fisher et al., 2020; Olagoke et al., 2021).

While the majority of studies on COVID-19 vaccine attitudes and hesitancy did not collect religion as a demographic variable from participants, the ones that did found significant effects (Callaghan et al., 2021; Olagoke et al., 2021). Beginning with the study done by Callaghan et al., they found that the odds of COVID-19 vaccine refusal were significantly higher

for individuals with high levels of religiosity. Furthermore, out of the various reasons for intending to refuse the vaccine, religiosity was only associated with a significant increase in believing the vaccine was not safe, rather than with concerns about effectiveness, finances, insurance, or having COVID-19 (Callaghan et al., 2021).

In another study, Olagoke et al. specifically investigated the relationship between religiosity and COVID-19 vaccination intention. The researchers found that there was a significant negative association between religiosity and COVID-19 vaccination intent, meaning that as religiosity increased, vaccination intent decreased. Additionally, they found that health locus of control (HLOC)—the degree to which people believe that they, as opposed to external forces, have control of their health—mediated 40.97% of the relationship between religiosity and COVID-19 vaccination intention. This means that external HLOC may serve as a pathway through which the negative association between religiosity and vaccination intent exists. When interpreting this result, Olagoke et al. explain that this confirms the concept of religious coping introduced above. Religious coping associates stressful life events, like COVID-19, with external HLOC so that the crisis can be viewed as an Act of God that cannot be prevented or controlled (Olagoke et al., 2021). In other words, one of the reasons a religious person might not intend to get a COVID-19 vaccine could be that they believe that external factors, such as religious forces, influence their health more than internal decisions or factors. This is an interesting idea and helps to explain why many efforts to encourage vaccination have come from or somehow involved religious leaders who discuss the importance of vaccination. Apart from religiosity, another demographic variable that has influenced attitudes and hesitancy towards the COVID-19 vaccine has been political affiliation.

*Political Affiliation as Predictor for COVID-19 Vaccine Hesitancy*

Given that many aspects of the COVID-19 pandemic have become politicized, it might not be a surprise that vaccination attitudes and intents to vaccinated against COVID-19 are also related to political party affiliation (Khubchandani et al., 2021; Viswanath et al., 2021; Ward et al., 2020). To first understand how individuals might relate their political understanding of the world to attitudes about the vaccine for SARS-CoV-2, Dan Kahan's work on motivated reasoning is especially helpful. Kahan reports that there are two pathways through which worldviews and ideology influence people's perceptions of issues or processes. He states that people either spontaneously perceive the issue as requiring a political interpretation, or their sources of information provide cues that signal the political nature of the issue (Kahan, 2008; Kahan et al., 2013). Relative to the politicization of the COVID-19 pandemic and mitigation measures, the latter pathway has been very influential. Some unusual behavior that has acted as a cue to establish politicization of the pandemic include political figures who have questioned the seriousness of the threat of COVID-19, the effectiveness of public health mitigation efforts, and the credentials of experts advising these efforts (Viswanath et al., 2021). A particularly interesting example is the symbolic relationship between masking and political identity which has become a divisive issue and politicized the pandemic even more (Khubchandani et al., 2021; Wood & Schulman, 2021).

Returning to vaccination attitudes, it can be argued that the politicization of COVID-19 extends to this realm as well. However, it is important to note that many studies of attitudes towards vaccination that were published throughout 2020 and even early 2021 did not include political party affiliation as one of the demographic factors collected or analyzed (Fisher et al.,

2020; Nguyen et al., 2021; Paul et al., 2021). Perhaps this lapse is due to the increasing polarization of COVID-related issues as the pandemic progressed, and maybe researchers did not view political parties as influential at the onset of their studies. Regardless, Khubchandani et al. found that Republicans and Independents had statistically significantly higher odds of being vaccine hesitant in regards to the COVID-19 vaccine (2021). Similarly, Callaghan et al. reported that conservatives and people who intended to vote for Donald Trump in the 2020 election were more likely to refuse the COVID-19 vaccine (Callaghan et al., 2021). Another group reported that not only did Democrats have a more favorable attitude towards COVID-19 vaccination, but from March to August of 2020 their attitudes showed no significant time trend whereas Republicans' attitudes followed a decreasing trend over time. Therefore as the pandemic continued, Republicans attitudes towards vaccination became more negative (Fridman et al., 2021).

Another difference in vaccination intent which is related to political ideals stems from the type of media sources that a person actively seeks out or passively receives. Viswanath et al. found that not only were Republicans less likely to vaccinate themselves and those under their care against COVID-19, but people who relied on more conservative news outlets were also less likely to vaccinate themselves and others (2021). Opposingly, people who relied on mainstream print sources as well as Google and Yahoo news were more likely to vaccinate against COVID-19 (Viswanath et al., 2021). However, media sources not only shape initial attitudes, but they can influence attitudes to become stronger or weaker overtime as well. In order to try to influence attitudes and address hesitancy in what they characterize as “the largest vaccine-hesitant subgroup in the United States,” Pink et al. exposed Republicans to elite party

cues and analyzed the results. They found that when Republicans listened to endorsement for the vaccine from prominent Democrats, they were less likely to encourage others to vaccinate and held more negative attitudes towards the vaccine than the Republican control group and the Republican participants who were exposed to Republican messaging (Pink et al., 2021). Overall these findings suggest that political party affiliation not only affects attitudes towards the vaccine, but also that the messages used to encourage vaccination must be tailored to various political followers in ways sympathetic to their unique concerns.

### **Apprehension Regarding the Speed of Development**

In the United States, the name given to the partnership initiated by the government to “fast track SARS-CoV-2 vaccines from conception to market in 1 year” was Operation Warp Speed (Wood & Schulman, 2021, p. 1). However, using language such as *fast track* and *warp speed* which suggests haste may not have had a positive effect on attitudes towards the vaccine. In fact, many national and international surveys have indicated that one of the largest concerns people have is that vaccines were developed too quickly, which may also influence safety (Brandt et al., 2021; Nguyen et al., 2021; Pogue et al., 2020; Ward et al., 2020). An illustrative quote that represents this idea and relates to the previous section centered on politicization is “I’m thinking a vaccine now might be approved too quickly because of political pressure” (Fisher et al., 2020, p. 13). This quote is likely representative of an attitude held by many Americans who witnessed the media coverage of vaccine development which emphasized speed and competition more than it did the rigorous testing of the vaccine candidates.

Believing that the vaccine development process was rushed is a specific attitude that in itself may not necessarily be that detrimental on intentions to vaccinate. However, this attitude is

most likely related to and influences many of the other negative attitudes and hesitations towards the vaccine such as a lack of confidence in the safety or effectiveness of the vaccine. Scientists and medical professionals have worked tirelessly to explain that the vaccines have been appropriately tested in clinical trials and the science that allowed them to be developed has existed for years (Fisher et al., 2020). Nonetheless, governmental pressures and financial incentives from Operation Warp Speed along with widespread media coverage highlighting the incredible pace of vaccine development has left many people questioning if that process was too fast to be true (Wood & Schulman, 2021). Two studies into COVID-19 attitudes found that people were specifically concerned about the novelty or newness of the vaccine, whereas others reported more concerns about the speed of development overall (Fisher et al., 2020; Szilagyi et al., 2021). While the former group of people may be less hesitant to get the vaccine now that it has been out for about a year, those concerned about the time it spent in development— which can no longer be changed— may still have those same concerns.

One study found that among adults who did not intend to get vaccinated, 21.6% of them in September of 2020 and 10.4% in December reported that their reason was due to concerns that the vaccine was being developed too quickly (Nguyen et al., 2021). In Ward et al.'s study in France, 64.4% of surveyed individuals reported that a vaccine produced in a rush is too dangerous, which was one of the reasons to refuse the vaccine (2020). Although that study allowed individuals to report multiple reasons for refusal, that is still a significant finding that highlights the impact that the speed of development or at least how the speed is contextualized influences attitudes.

An even clearer understanding of the relationship between attitudes and the amount of time the vaccine spent in development comes from Pogue et al.'s study. They found that 35.49% of participants strongly agreed with and 37.65% agreed with the statement "I worry that the rushed pacing of testing for a new COVID-19 vaccine will fail to detect potential side effects of dangers" (Pogue et al., 2020, p. 8). That statement directly connects the pace of development with safety and side effects as well as uses *rushed*, which could have created a negative connotation that swayed some respondents to be more likely to agree. Regardless of this, when asking participants the minimum length of time the vaccine would need to be tested for them to be comfortable with the process, the results are very interesting. Most people (38.84%) said six months to a year, but many also said three to six months (27.78%) and one to two years (20.68%) (Pogue et al., 2020). The variation in response shows that although people are concerned about the length of time the vaccine spends in testing, there is no consensus on how much time would have been sufficient.

### **Mistrusts of Specific Aspect of Vaccine or Distribution**

Another widely cited attitude towards the COVID-19 vaccine or the vaccination process is mistrust. While some reports of mistrust are related to the vaccine itself or its cited benefits, many are due to a lack of confidence in government, governmental agencies that oversee healthcare, or officials encouraging vaccination.

#### ***Mistrust of U.S. Government or Healthcare-Related Agencies***

A poll conducted in early 2021 by The Robert Wood Johnson Foundation and Harvard T.H. Chan School of Public Health found that only 52% of Americans have a great deal of trust in the CDC. Local and state health departments are trusted even less among adults; only 44% of

those surveyed trust local and 41% trust state health departments “a great deal” (Harvard T.H. Chan School of Public Health, 2021). This lack of trust and decline in ratings of the public health system since the pandemic started could be due to a wide variety of factors, one being the constant changes in messaging from public health officials and agencies. A qualitative study done in Canada found that the most common critique of public health messaging related to COVID-19 was the conflicting nature of guidelines and measures encouraged to mitigate the spread of disease. Additionally, participants were critical of a lack of resources to carry out the COVID-19 recommendations (Benham et al., 2021).

Similar critiques and related attitudes to those expressed in Canada are likely contributing to the mistrustful attitudes towards the COVID-19 vaccine in the U.S. as well. Nguyen et al. found that 12.5% of adults who did not intend to get vaccinated cited a mistrust of the government as their main reason (2021). Fisher et al. reported that 32.5% of people not intending to be vaccinated and 12.7% who were unsure about vaccination stated that a lack of trust was their motivating force; of those mistrustful adults not intending to be vaccinated 18.5% were mistrustful of the government and CDC, and many referenced conspiracy theories (Fisher et al., 2020). Although the COVID-19 pandemic is a dynamic situation which requires guidance that is not always consistent from day to day, it is still essential that Americans trust health officials and government agencies such as the CDC so that they have confidence in the information they are given about the pandemic and vaccines.

### ***Lack of Confidence in Vaccination Benefits***

Along with mistrust in the COVID-19 vaccine related to institutions, another aspect of mistrust is a general lack of confidence in vaccine benefits. If a person cannot trust that the

vaccine will be beneficial and they are simultaneously concerned about harm from vaccines as previously mentioned, having a negative attitude towards it only makes sense. In the U.K., Paul et al. found that as related to mistrust of general vaccine benefits, 7.2% of people had very negative attitudes and 17.2% had intermediately negative attitudes (2020). Although these questions were not directly with respect to the COVID-19 vaccine, they also reported that strong and intermediate levels of mistrust of benefits were associated with a five times higher relative risk of being unwilling to receive a COVID-19 vaccine (Paul et al., 2021).

Related to a mistrust of vaccine benefits is a worry that the vaccine will not be effective. In a free response question that asked people's biggest fear of the potential COVID-19 vaccine, Pogue et al. identified effectiveness as the second most common answer, behind safety (2020). In a similar question, they found that as the hypothetical efficacy of COVID-19 vaccine (not yet known at the time of the study) increased, people reported an increased likelihood to be vaccinated which may have been related to their increased trust in the vaccine (Pogue et al., 2020). Additionally, multiple other studies of COVID-19 vaccine attitudes and hesitancy identified a lack of trust in vaccine effectiveness or efficacy to be one of the main reasons driving vaccine non-intent or hesitancy (Brandt et al., 2021; Callaghan et al., 2021; Fisher et al., 2020; Ward et al., 2020). Therefore, not only does it matter that individuals trust the people and agencies promoting vaccination, but establishing a trust of its benefits and effectiveness are also important.

### ***Mistrust and Other Causes for Hispanic/Latinx and Black People to Not Become Vaccinated***

A couple groups of people which the American media and other sources have focused on when discussing mistrust of the COVID-19 vaccine are Black people and people of

Hispanic/Latinx descent<sup>4</sup>. Although there is data to support some of these claims, the attitudes of Hispanic/Latinx and Black individuals are much more complicated than they are made out to be. Black and Latinx communities have justifiable and multifactorial reasons—which will be outlined below—to distrust the scientific and healthcare institutions responsible for developing COVID-19 vaccines (Opel et al., 2021). These factors of mistrust have no doubt contributed to the greater degree of hesitancy and negative attitudes toward the COVID-19 vaccine that many studies have reported in Black and Hispanic people (Callaghan et al., 2021; Fisher et al., 2020; Khubchandani et al., 2021; Nguyen et al., 2021; Opel et al., 2021). When directly asked, only 18% of Black Americans and 40% of Latinx Americans reported trusting that the COVID-19 vaccine would be effective and fewer trusted that it would be safe (Opel et al., 2021).

The mistrust of these Black and Latinx individuals has both a historical and modern-day foundation which is complicated and deserves to be explored. Historically, their mistrust is “rooted in a history of unethical medical and public health experimentation involving communities of color” such as the sterilization abuse of Chicana women, the Tuskegee Syphilis experiments, and the experiments of Dr. J. Marion Sims who founded modern gynecology (Enoch, 2005; Opel et al., 2021, p. 1; Suite et al., 2007). However, also important to consider—and with greater relevance to the current situation of COVID-19 disparities and vaccination—are the structural inequities, institutional racism, and everyday racism that communities of color must endure (Bajaj & Stanford, 2021; Corbie-Smith, 2021; Opel et al., 2021). These factors are

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<sup>4</sup> Note that Latinx refers to all people whose ancestry is connected to a Latin American country where Spanish or Portuguese are spoken, including most of Central/South America, the Caribbean, and Mexico. Hispanic refers only to people whose ancestry is from a Spanish-speaking country, including Spain and excluding many Latin American countries where other languages are dominant. Although these terms are distinct, since they overlap and some studies report Latinx data while others use Hispanic, I will use both categories when talking broadly and the corresponding term when relaying study-specific information.

represented in healthcare by the over prevalence of misdiagnosis and withholding of medical treatment for Black and Latinx individuals (Bajaj & Stanford, 2021). Those situations, among many others, are a result of systemic racism that contributes to mistrust which may make Hispanic/Latinx and Black Americans less likely to seek vaccination against COVID-19 (Opel et al., 2021).

Returning to the results found in the studies, it is important to recognize that while the hesitancy and negative attitudes from people of Hispanic origins about the COVID-19 vaccine has been inconsistent and dynamic, there is more consistent data to suggest that Black people have increased hesitation. In one study, Hispanic people were found to be more hesitant towards the COVID-19 vaccine (Khubchandani et al., 2021). Other studies either found that Hispanics were either less likely to be vaccinated only before adjusting for participant characteristics (Fisher et al., 2020), or they found no significant relationship between ethnicity and COVID-19 intentions or attitudes (Callaghan et al., 2021; Nguyen et al., 2021; Pogue et al., 2020). When looking at the attitudes and intentions of Black people though, studies have found that they have a greater hesitancy, likelihood of refusal, or lack of intent to vaccinate against COVID-19 (Callaghan et al., 2021; Fisher et al., 2020; Khubchandani et al., 2021; Nguyen et al., 2021).

Given that Black people are also at an increased risk of morbidity and mortality from COVID-19, it is crucial to understand why these hesitancies exist so that an increased disease burden and decreased vaccination does not magnify health disparities already experienced by African Americans (Fisher et al., 2020; Nguyen et al., 2021). Not only are the historical and structural factors outlined above important, but it is essential to identify specific attitudes that Blacks have reported about COVID-19 vaccination. Although each person is likely to have

complex reasons for wanting to refuse the vaccine, one study by Callaghan et al. identified four reasons for which Black Americans were more likely to not pursue vaccination than White Americans (2021). They found that Blacks are more likely than Whites to be concerned about safety, effectiveness, lack of insurance, and lack of financial resources (Callaghan et al., 2021). This finding emphasizes the large impact of social inequities on decision making for Black Americans. Whereas a concern for safety and efficacy could be driven by mistrust or a lack of information, the financial burden and insurance concerns represent problems that are exacerbated in the Black community since on average, Black Americans have lower levels of socioeconomic status across all indicators when compared to White Americans<sup>5</sup> (Williams et al., 2016).

Furthermore, even for those Black and Hispanic Americans who have a positive attitude towards the vaccine and intend to get vaccinated, lower socioeconomic status and disparities in other social determinants of health— community accessibility, clinic hours, transportation, and access to internet to sign up— may also make it more difficult to actually be vaccinated against COVID-19. In fact, a study done by Ayers et al. found that while Hispanics and Blacks had similar or higher intentions to get vaccinated against H1N1 than whites, actual vaccine uptake was disproportionately lower in these groups due to structural issues. Since they identified barriers to vaccine access as a potential contributing factor to this disparity, Ayers et al. emphasize that COVID-19 vaccination efforts should “prioritize vaccine accessibility and convenience in African American/Black, Latino, and low-SES communities” (Ayers et al., 2021, p. 1374). Although this approach would have been the best to avoid further disparities affecting Black and Hispanic/Latinx communities, there are still “underlying fundamental inequalities in

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<sup>5</sup> It is important to note that the survey referenced here was conducted from May to June, 2020, which was before Americans knew that the vaccine would be administered free of charge, regardless of insurance status.

the system of vaccine distribution” that further exemplify the structural racism that causes people of color to be mistrustful to begin with (Corbie-Smith, 2021, p. 1). Therefore, this cycle of inequitable access to care and mistrust is ongoing, not only within the COVID-19 pandemic but across all sectors of healthcare and beyond (Corbie-Smith, 2021; Opel et al., 2021).

### **Attitudes About Vaccinating Children**

Given that children are also susceptible to COVID-19 and more likely to be asymptomatic carriers of the disease, several studies have been done to evaluate the willingness of parents and/or children to be vaccinated against COVID-19 (Brandt et al., 2021; Ruggiero et al., 2021; Szilagyi et al., 2021). Although most of the studies focus on the question of willingness to vaccinate children, several attitudes also emerge in the process. Additionally, while at least one study reported youth’s own attitudes towards the vaccine, individuals under the age of 18 must acquire parental consent in order to be vaccinated (Brandt et al., 2021). Therefore, oftentimes when attempting to determine how many children may become vaccinated, researchers were more likely to directly survey parents than to survey the children themselves.

An example of this tendency to ask parents is Ruggiero et al.’s study which found that 44% of surveyed parents had a positive attitude towards the COVID-19 vaccine, and 49.45% said that they want the COVID-19 vaccine for their child (2021). In the same study, only 21.93% of parents reported overall vaccine hesitancy whereas 69.53% of parents report more hesitancy towards the COVID-19 vaccine than previous vaccinations; factors that increased parental vaccine hesitancy include concern for vaccine side effects (61.5%) and vaccine safety (48.96%) (Ruggiero et al., 2021). These concerns show that parents have similar concerns about the vaccines as the general public since safety and side effects were a major factor influencing

negative attitudes or hesitancy in wider adult populations (Callaghan et al., 2021; Fisher et al., 2020; Nguyen et al., 2021; Paul et al., 2021; Pogue et al., 2020).

Szilagyi et al. found that for 46% of children, parents were “very likely” or “likely” to have their child get the vaccine; for 9%, parents were “somewhat unlikely”; for 33%, parents were “very unlikely”; and, for 12%, parents were “unsure” about having them get the COVID-19 vaccine (2021). They additionally found that when parents had a bachelor’s degree or higher educational attainment, were Asian American or Hispanic, or had already received or were likely to receive a COVID-19 vaccine themselves, there was a higher likelihood of getting the vaccine for their child. The final factor is especially interesting because among parents who had already received or planned to get vaccinated, 75% wanted the COVID-19 vaccine for their child whereas only 10% of parents who did not plan to get vaccinated were likely to vaccinate their child (Szilagyi et al., 2021). While the 75% is encouraging, it also begs the question of why the rest of the parents who either did or planned to get vaccinated themselves would not want the vaccine for their children. Whether this gap is caused by concerns of vaccine safety, the lower prevalence of symptomatic cases in children, or another factor, the less than a 50% parental vaccine intention rate for children found in both the Ruggiero and Szilagyi studies represents a lower percentage than adults who intended to get vaccinated themselves against COVID-19<sup>6</sup> (Fisher et al., 2020; Khubchandani et al., 2021; Nguyen et al., 2021; Ruggiero et al., 2021; Szilagyi et al., 2021).

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<sup>6</sup> Viswanath et al. found that 65% of parents agreed that they would vaccinate people under their care (such as children), still reporting a greater percentage of people (68%) willing to vaccinate themselves in the same study (2021). However, in the Pogue et al.’s study, when asking about the time that the vaccine spent in testing before being released, a greater percentage of respondents with children than respondents overall said they were willing to vaccinate their children after either a 30-day period (70.45% vs. 66.05%) or a 6 month period (76.02% vs. 74.38%).

Interestingly, in a national study of youth opinions on COVID-19 vaccination in the U.S., Brandt et al. found the opposite trend— that 75.9% of youth themselves reported willingness to receive a COVID-19 vaccine, which is higher than most of the studies examined that specifically report adult’s vaccine intentions (Brandt et al., 2021; Fisher et al., 2020; Nguyen et al., 2021; Viswanath et al., 2021). It should be noted that in Brandt et al.’s study, the definition of *youth* used and thus the population in which the survey was conducted included people from 14 to 24 years of age. These youth demonstrated both conditional and unconditional willingness to become vaccinated, and protecting oneself and others was the most frequent reason for wanting to vaccinate. Among those who did not want to vaccinate, safety was again the foremost concern (Brandt et al., 2021). Although it is impossible to use their reported data to directly evaluate only responses of children under the age of 18, it seems as if youth themselves may have more positive attitudes towards the vaccine than their parents. While this could have important implications on ethical issues of autonomy over one’s own body, in the end it is the parent’s legal decision to decide whether children may be vaccinated. Therefore, when considering who might become vaccinated against COVID-19 and contribute toward herd immunity, only those children whose parents will allow them to become vaccinated can be counted.

### **Attitudes of Individuals Who Delayed COVID-19 Vaccination**

#### **Introduction and Design**

In order to complete this thesis and contribute to the studies already conducted and reported on above, a study was designed to evaluate attitudes, attitude changes, and motivations of individuals who delayed COVID-19 vaccination, not receiving the vaccine when it was first available to them. The research questions aimed to determine the attitudes of more recently

vaccinated individuals towards the COVID-19 vaccine when it became widely available to the public (in April of 2021) and when they got vaccinated. From there, the goal was to identify if there were any major changes that occurred between those two periods of time that contributed to an attitude change in those individuals, and if not, what motivated them to get the vaccine. Elucidating the attitude patterns and motivation in individuals who delayed yet ultimately received the vaccine not only offers a psychological perspective to this phenomenon which is influenced by sociological circumstances, but it also may identify which factors could be useful in swaying the large number of people who are still hesitant to receive the COVID-19 vaccine.

Although the original design of the study aimed to do a qualitative analysis of five video-recorded interview sessions, a lack of response to recruitment materials necessitated an alternate approach. While the overarching research questions remained the same, the interview guide that would have been used for the interviews was converted to an online questionnaire using Google Forms. Most of the questions were adjusted to be on a Likert scale, but some required percentages or were kept open ended, encouraging brief responses. Overall, questions probed participants' attitudes about vaccines in general, government involvement in public health issues, the COVID-19 vaccine, and the course of the pandemic. Additionally, participants were asked to report the approximate percentages of their friends, family, and co-workers (if applicable) that were vaccinated when they got the vaccine and whether this influenced their decision. The questionnaire was distributed via the online platform Prolific which recruited and compensated eligible participants— people who had lived in the U.S. since April of 2021, delayed vaccination until at least July of 2021 or later, and were 18 years or older.

## Results

Although 50 people participated in the study, three of those participants answered ‘No’ to the question “Have you received the first dose of a COVID-19 vaccine since July of 2021 or later?” and were therefore automatically excluded from data analysis.<sup>7</sup> The majority of participants were female (74.5%), white (57.4%), and ages 18-34 (78.7%). Upon analysis of the data using Chi Square tests, several significant results were found. Although a couple of the significant results were related to age, due to the age being skewed to young adults, only a few individuals over the age of 34 were driving any effect (especially one 50-64 year-old); therefore, these results are not reported. Additionally, while race/ethnicity<sup>8</sup> and gender were also collected, no significant results were found related to these demographic factors.

In these surveyed individuals who delayed vaccination, attitudes towards vaccines in general were significantly positively associated with both their attitudes toward the COVID-19 vaccine in April ( $p < 0.001$ ) and at the time of their vaccination ( $p < 0.001$ ). In other words, as attitudes were more favorable towards vaccines in general, they also became more favorable towards COVID-19 vaccine at both timepoints. Another significant result was that as participants thought the Federal government should have *more* involvement in public health issues, their attitudes towards the COVID-19 vaccine in April 2021 were *more favorable* as well ( $p = 0.016$ ).

When analyzing the relationship between attitudes towards the COVID-19 vaccine in April 2021 and at the time of delayed vaccination, it was interesting to find a significant positive correlation between the two sets of attitudes ( $p < 0.001$ ). Furthermore, a vast majority of 83.0% of

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<sup>7</sup> Given how the Google Form was formatted, these individuals should have automatically been sent to the end of the form since they were ineligible. However, they must have paged back through the form in order to answer everything anyway. This technical glitch or workaround is a limitation to the study since it prevented three additional individuals who were eligible from participating.

<sup>8</sup> Collected via a question that included both racial and ethnic categories, asking individuals to check all that apply.

individuals reported no attitude change at all between the two timepoints. In the minority of individuals who did report attitude changes, they were asked to explain this change. For participants who had a positive attitude change— only one person showed a negative change— responses ranged from feeling more comfortable after researching the vaccine to originally being ‘uneasy’ about how long the vaccine existed to being unsure about trusting the vaccine when it was first released. One participant in particular whose attitudes towards the vaccine increased from *very unfavorable* in April to *mostly unfavorable* when they became vaccinated said “I still wasn't interested in getting it but got it out of socialite pressure.” For participants who did not experience an attitude change but ultimately decided to receive the COVID-19 vaccine following a delay, main *motivating factors* included wanting to protect themselves and others (social responsibility), stopping the spread of the virus, and ending the pandemic. Some factors that were reported less often but at least twice were the belief in vaccines or science in general, wanting to continue work, and traveling to certain places.

The last result to report is how much other people may (or may not have) had a decision on participants’ decisions to become vaccinated. Separate questions were asked about the percentage of family, friends, and co-workers participants knew who were vaccinated at their time of vaccination. The only significant relationship found was a positive correlation between percentages of friends vaccinated and attitudes toward the COVID-19 vaccine at the time of vaccination. Overall, when answering the question “How much influence did the number of people you knew who were vaccinated affect your decision to become vaccinated?,” a majority of respondents reported either a *very weak influence* (44.7%) or only *some influence* (31.9%) on their decision.

## Discussion

Overall, this study yielded noteworthy results that contribute to the existing field of research into COVID-19 vaccine attitudes. Although it makes sense why a large percentage of participants were younger given that the survey was fielded through an online survey platform, the fact that almost 75% of them identified as females is surprising. It is possible that this could have been the case because more females may be engaged in finding part-time work on Prolific, they were more interested in the topic, or another unrelated factor. Additionally, the result that demographic factors such as age, race, ethnicity, and gender were not associated with any attitudes towards the COVID-19 vaccine is incongruent with results from previous studies. This suggests either that demographic factors have played less of an influence on attitudes since April of 2021 or that there were not enough participants to find a significant effect.<sup>9</sup>

The significant relationships between attitudes towards vaccines in general and attitudes towards the COVID-19 vaccine in April 2021 and at the time of vaccination seem to reflect the data presented above. The fact that a less favorable attitude about vaccines in general leads to a less favorable attitude towards the COVID-19 vaccine as found in this study demonstrates the fact that anti-vaccination attitudes or prior vaccine hesitancy predicted a lower intent to or negative attitudes about vaccinating against COVID-19 (Fisher et al., 2020; Olagoke et al., 2021; Ward et al., 2020). Additionally, as mentioned previously, Pogue et al. found that vaccine history and routine vaccination were the most important predictors of intent to receive the COVID-19 vaccine; although they were using behaviors to predict COVID-19 intent, the pattern of prior or generalized vaccine tendencies affecting current ones is the same (2020).

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<sup>9</sup> Again, age was found to have a significant effect on certain questions but since it was so skewed, these results were not considered to be truly representative.

The result which revealed that belief in governmental involvement was correlated with attitudes towards the COVID-19 vaccine in April 2021 was also not surprising given the role that mistrust has been shown to play in vaccine attitudes or intentions. Since someone who thinks that the government should be involved less in public health initiatives may not trust the government, it would follow that they also do not have as favorable of attitudes toward the COVID-19 vaccine as previous patterns elucidated. However, it is also important to recognize that mistrust is only one pathway through which belief in government involvement might affect COVID-19 vaccine attitudes, and that this study did not actually investigate mediating factors.

Examining the influence that others had (or did not have) on participants' decisions to get vaccinated is interesting. While the majority of people said that others had either *very weak* or *some influence* on their decisions, there was a significant relationship found between the amount of friends vaccinated and attitudes toward the COVID-19 vaccine at the time of vaccination. This unique relationship seems to make sense though because among the three categories of relationships investigated— family, friends, and coworkers— friends are the people who most individuals *choose* to be in their lives more so than the others. Therefore, when close friends of participants who share similar values were vaccinated, the social pressure created on the participants could have been influential.

Lastly, the most shocking result was that attitudes toward the COVID-19 vaccine in April 2021 and at the time of vaccination were significantly positively correlated such that most people did not change their attitudes prior to being vaccinated and even reported positive attitudes in April. Given that many participants (87.2%) did report favorable attitudes toward the vaccine in April 2021 but yet still waited until at least July of 2021 to get vaccinated, it is clear that for

these individuals, their attitudes did not predict behavior. It is possible that they had barriers to accessing a vaccine, were opting for the “wait and see” approach despite positive attitudes, or another factor led to them not getting vaccinated sooner. Regardless of their initial barriers, overall their motivation to eventually get vaccinated seems to reflect motivations that many others would have, including people who did not delay vaccination. Therefore, without a distinguishing motivational factor, it would be difficult to use these individuals’ thought processes to inform messaging or strategies used to approach others who are not yet vaccinated. Perhaps with further questioning or a more in-depth interview a more obvious pattern, psychological, or sociological factor might emerge, but as stated previously, a lack of community response halted this investigational approach.

Apart from not being able to do in person interviews and the age results being skewed, there were several other possible limiting factors to this investigation. One limitation was the somewhat low number of participants (50) given the ease of conducting online surveys; if there were more participants, some of the trends which were not reported may have become significant. Another limitation is that participants were recruited from a crowdsourced sample of people who were already on Prolific; they are likely used to answering surveys for a monetary incentive. Although the amount of money they got from this short questionnaire was small (<\$1.75), this nonrandom sample of participants could have led to some of the demographic and other differences. Finally, the greatest limitation is that since a researcher was not able to read the eligibility requirements aloud, it is not guaranteed that each participant actually delayed vaccination until July of 2021 or later. While this eligibility requirement was repeated in writing three times— one of those being a question which the 47 included participants answered “yes”

to— it is still not guaranteed whether individuals definitely delayed vaccination since a proof of vaccination was not obtained.

### **Overall Conclusions and Predicting the Future?**

After examining this topic extensively for the past ten months and learning more about COVID-19, the vaccines, and a myriad of related issues, it is safe to say that the world has truly changed as a result of this pandemic. Critical questions have arisen in our society about ethics, scientific research processes, the influence of political affiliation, healthcare management, and more. While some of them have begun to be answered, there are many important questions and issues still left untouched. Somewhat surprisingly— yet at the same time not a shock given the divisive discourse surrounding COVID-19 precautions, masking, and vaccination in this country— the United States has fallen behind many other countries in regards to vaccination rates for COVID-19. According to statistics shared via *Our World in Data*, only 69.8% of Americans have received at least one dose of a COVID-19 vaccine and 59.1% have been fully vaccinated (Ritchie et al., 2021). Given that cases continue to spread and people continue to die daily from COVID-19, hopefully as we approach the winter months, that percentage will keep increasing. As presented in the current paper, through the ethical principles of Aggregate Collective Responsibility and the Fairness Principle, individuals do indeed have an ethical obligation to get the vaccine to contribute to herd immunity, which we still have yet to reach (Giubilini, 2019). However, this fact alone is not enough to stop others from free riding as the majority works towards herd immunity (van den Hoven, 2012).

Turning now to recap the main attitudes that were found against COVID-19 vaccination in the various studies examined, four main themes emerged. Some people were hesitant towards

or against COVID-19 vaccination because of concerns about safety or side effects of the vaccines, apprehension regarding the speed of development, or mistrust of governmental entities or the benefits of vaccination (Brandt et al., 2021; Callaghan et al., 2021; Fisher et al., 2020; Nguyen et al., 2021; Paul et al., 2021; Pogue et al., 2020; Ruggiero et al., 2021; Szilagyi et al., 2021; Ward et al., 2020). Another factor that influenced negative attitudes towards or lack of intention to receive the COVID-19 vaccine was either anti-vaccination attitudes or prior vaccine hesitancy towards routine vaccination such as the influenza vaccine (Fisher et al., 2020; Nguyen et al., 2021; Paul et al., 2021; Pogue et al., 2020; Ruggiero et al., 2021; Szilagyi et al., 2021; Ward et al., 2020). Demographic factors that predicted a tendency towards these attitudes included being a woman/female, conservative/Republican, Black, having increased religiosity, and according to a minority of studies being Hispanic (Callaghan et al., 2021; Fisher et al., 2020; Khubchandani et al., 2021; Nguyen et al., 2021; Olagoke et al., 2021; Opel et al., 2021; Paul et al., 2021; Pink et al., 2021; Viswanath et al., 2021; Ward et al., 2020). Some of these factors were found to have both contemporary and historical influences, whereas others such as being a woman were not as easily understood.

As for the demographic group of children, it is hard to encapsulate the various attitudes that both parents and children themselves have towards the vaccine and how they might be influenced by the parents' vaccination experiences and children's opinions. Overall, many of the same patterns emerge, but it seems as if vaccination intent by parents for their children is lower than adolescents' intent for themselves and the intent of adults as a whole (Brandt et al., 2021; Ruggiero et al., 2021; Szilagyi et al., 2021).

Lastly, in the study that was recently conducted at DePauw University and fided through an online survey, the most important and surprising finding which expands upon what was found in the literature review is that a large majority of individuals who delayed vaccination did not experience an attitude change prior to vaccination. In fact, many participants reported positive attitudes towards the vaccine when it became widely available in the U.S. in April 2021. This data supports the fact that attitudes cannot always predict behavior, but yet they are still interesting to study on their own merit. Furthermore, although participants reported that others did not influence their attitudes towards the COVID-19 vaccine, the correlation between friends' vaccination statuses and attitudes at the time of vaccination indicates that that was not true in every case. At the end of the day, both sociological and psychological factors influence individuals' attitudes towards the vaccine and decision whether to pursue vaccination. As we near the two year anniversary of the pandemic, one can hope that the acute effects of COVID-19 will soon be behind us. However, given the incalculable course of the virus and strong attitudes towards both the pandemic and the vaccines designed to put an end to it, the task of predicting the future is unquestionably too complicated to attempt.

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