RESEARCH ARTICLE

# Bridging the gap: Political engagement and trust as mediators of racial health inequities and vaccine reluctance

Florent Nkouaga

National Association of Insurance Commissioners (NAIC), Kansas City, MO, USA

**Abstract:** This paper investigates how political engagement and trust can reduce health disparities in the context of COVID-19 vaccine hesitancy. It posits that active participation in the political process and trust in political institutions enable communities, especially marginalized ones, to advocate for equitable health policies, leading to more inclusive healthcare services. The study employs a multidisciplinary approach to understand how politics influence individual and collective health behaviors and decision-making. The research uses t-tests and logistic regression to analyze the relationship between political factors (like interest and participation) and trust in political and federal systems on COVID-19 vaccine hesitancy. The t-test examines disparities in vaccine hesitancy across racial groups, revealing significant differences and emphasizing the impact of race on health behaviors. Logistic regression, controlling for variables such as partisanship and media influence, further explores these relationships, showing a consistent negative correlation between trust in federal institutions and vaccine hesitancy across racial groups. The study also finds that this correlation varies by race, with trust in the political system and political participation influencing vaccine hesitancy to different degrees among racial groups. These findings underscore the complex interplay between political engagement, trust, and health behaviors, highlighting the role of politics in shaping public health outcomes.

**Keywords:** health service acceptance, political engagement, political trust, vaccine hesitancy, health disparities, COVID-19

## 1 Introduction

Understanding the underlying factors that shape societal attitudes and behaviors is crucial for assessing the effectiveness of public policies. Analyzing these aspects within a population reveals the prevailing beliefs, values, and behaviors, influencing how people react to various policies. As posited by Easton (1955), politics serves as a mechanism for the authoritative distribution of societal values. This idea implies that political institutions significantly influence their constituents' attitudes and behaviors via their standard processes and the information they distribute.

Further, March's (1978) theory of Bounded Rationality posited that individual preferences are flexible and evolve in response to the social environment. This suggests that the social context plays a crucial role in the decision-making processes of individuals. In public health, attitudes and behaviors toward health represent a combination of personal beliefs and actions impacting individual and community health. In this light, the influence of institutional rules and operational mechanisms is crucial. Political institutions contribute to the dynamics that shape individual decision-making processes, thereby playing a fundamental role in determining how individuals and communities respond to health-related issues and policies.

The concept of bounded rationality addresses the limitations in decision-making processes due to individuals' inherent constraints. Traditional views on decision-making assume that individuals can rank alternatives based on a comprehensive analysis of all available information, aligning their choices with their values and beliefs. However, bounded rationality, a theory introduced by Simon (1976), suggests that in reality, individuals do not possess perfect information, nor do they have the unlimited cognitive capabilities to process all information even if it were available. This limitation leads to decision-making without a complete ranking of preferences, primarily due to the lack of information and the high cost of acquiring it (Quadrel et al., 1993; Downs, 1957; Gigerenzer & Todd, 1999). As a result, individuals often resort to

satisfactory solutions rather than optimal ones. The concept also acknowledges that individuals cannot accurately predict all consequences of their decisions at both personal and collective levels, leading to more subjective choices (Edwards, 1961; March, 1994). Individuals rely on heuristics or mental shortcuts to cope with these limitations. These shortcuts are influenced by various social and political institutions like family, political parties, schools, and communities, which help simplify decision-making processes. These heuristics, while useful, may not always lead to the best possible outcomes, as they are based on limited information and processing capacity (Abelson, 1985).

The intersection of politics and health behaviors is a critical area of study, as political decisions often shape the healthcare landscape, funding priorities, and public health policies that directly impact population health. The significance of understanding this interplay must be considered, particularly in an era where political divides and policy decisions have tangible effects on public health outcomes—in a context marked by a major pandemic such as the COVID-19 pandemic, understanding behaviors that lead to the refusal of compliance with public health guidance such as the getting vaccinated lead to question no health-related factors that influence health attitudes and behaviors.

The phenomenon of vaccine hesitancy during the COVID-19 pandemic has been significantly exacerbated by the politicization of the crisis and the vaccines themselves. Research underscores the negative consequences of politicizing health emergencies, particularly with COVID-19. Politicizing health crises can erode public confidence in scientific and healthcare guidance, consequently amplifying vaccine hesitancy (Abbas, 2022). Moreover, studies have identified partisanship polarization as a significant barrier to COVID-19 vaccine acceptance, indicating the adverse effects of political factors on health behaviors (Jones & McDermott, 2022). However, the polarization of political views is identified as a significant barrier to achieving higher vaccination rates. However, it's important to note that not all conservatives or individuals with a specific political leaning are vaccine-hesitant. The complexity of vaccine hesitancy encompasses a range of demographic, social, economic, and environmental factors, and it cannot be solely attributed to political affiliation (Bolsen & Palm, 2021; Sharfstein et al., 2021; Albrecht, 2022; Alemi & Lee, 2023; Rasul & Ahmed, 2023).

The prevailing research on the intersection of politics and health often highlights the negative aspects, particularly how political biases and distrust can lead to resistance against public health services like COVID-19 vaccinations. However, this study shifts the focus to the potential positive impact of political factors on health attitudes and behaviors. It delves into how an individual's political interest and trust in their government can influence their acceptance of public health services. Political trust, in particular, emerges as a significant element, potentially leading to increased compliance with public health measures and reduced vaccine hesitancy. This aspect is crucial in understanding how political dynamics can enhance public health response during major crises like the COVID-19 pandemic.

Furthermore, this research probes how political engagement and trust can aid in narrowing health disparities. By actively participating in the political process and placing trust in political institutions, communities, especially marginalized ones, can influence and advocate for more equitable health policies. This can lead to a more inclusive health service provision, ultimately reducing disparities in healthcare access and outcomes. By examining the role of political factors through a multidisciplinary perspective, this study aims to provide a more nuanced understanding of how politics can shape individual and collective health behaviors and decision-making processes.

## 2  Background

Health service acceptance refers to the process by which individuals or communities recognize, seek out, and utilize healthcare services. It encompasses the willingness of people to access and adhere to medical advice, treatments, and preventive measures offered within healthcare systems. This concept is influenced by a multitude of factors including perceived need, personal beliefs about health and healthcare, accessibility and availability of services, cultural and social norms, and the quality of care provided. The acceptance of health services is a critical component in ensuring effective healthcare delivery, as it directly impacts how individuals engage with health systems, their compliance with treatment regimens, and ultimately, their health outcomes. The concept underscores the importance of aligning healthcare services with patient needs, expectations, and preferences to improve overall health service utilization and effectivenes.

Research in healthcare acceptance focus primarily on factors such as socioeconomic status, technology, and health care utilization (Tzenios, 2019; Jung & Loria, 2010). Health service acceptance in the United States is influenced by a combination of social determinants, technology acceptance, geographic disparities, and other factors that affect healthcare utilization. This research aims to provide more about the other factors, notably political factors, that influence health service acceptance.

Maintaining a population health and dynamic involve producing health services as a public good where everyone has equal access to the service and the usage of one do not alter the usage of the others. The case of the COVID-19 is a good example. The COVID-19 pandemic, due to its high transmission rate and negative impact on human health, has emerged as a critical issue not just in public health but also in the economic and political realms. As argued by Chauhan et al. (2021), the widespread and severe nature of the pandemic necessitates the development of effective strategies to curb its spread and minimize its social impact (Moreover, the concept of decision-making in such a crisis is complex. Simon (1976) contends that the ideal of absolute rationality or substantive rationality in decision-making is impractical. In reality, decision-makers are limited by the information at their disposal and time constraints. Consequently, they often resort to procedural rationality, where decisions are made based on what is deemed sufficiently adequate under the circumstances, rather than achieving an optimal solution.). Additionally, the decision-making process, especially in the context of a pandemic, is influenced by various political factors, including polarization, which significantly affects how policies are formulated and implemented.

## 2.1   The issue of vaccine hesitancy

Vaccine hesitancy is characterized by the postponement or rejection of vaccination, even when vaccine services are readily accessible (Wiysonge et al., 2022; Lazarus et al., 2022). This phenomenon is multifaceted and dependent on the specific context, changing with time, location, and different vaccines. It is shaped by elements like complacency, ease of access, and trust. Vaccine hesitancy has been recognized as a significant threat to global health (Dubé et al., 2014; Dubé et al., 2021; Wiysonge et al., 2022).

Vaccine hesitancy is a matter of concern because of its role as a barrier to vaccine uptake despite being freely accessible by all, as seen in high-income countries or regions, where it forms a critical challenge to public health interventions like COVID-19 vaccination programs (Aw et al., 2021). The concept has been described and applied inconsistently, indicating a need for a more unified and clear definition and measurement. Systematic reviews suggest defining it as a state of indecisiveness regarding vaccinations, emphasizing the need to understand it from a global perspective (Larson, 2022; MacDonald, 2015). This inconsistent application of the concept underlines the importance of tailored approaches to address the root causes of hesitancy in different contexts.

Vaccine hesitancy represents more than a personal decision; it implicates larger societal and public health dimensions. In public health, vaccines can be seen as public goods that benefit the entire population. The repercussions of vaccine hesitancy are profound, potentially leading to outbreaks of preventable diseases, thereby obstructing efforts to control and eradicate diseases (Orenstein et al., 2022). Beyond individual safety, vaccine hesitancy impacts the collective well-being of society. When people delay or reject vaccines, it undermines the overall acceptance of health services, a cornerstone in maintaining public health. Mesa et al. (2022) observe that vaccine hesitancy has prolonged public health crises, as exemplified in the COVID-19 pandemic, where it has been a factor that perpetuates the pandemic's impact. Therefore, addressing vaccine hesitancy is not solely about individual persuasion but also about bolstering the perception of health as a communal responsibility and a shared benefit.

During the COVID-19 pandemic, vaccine hesitancy emerged as a major obstacle in the public health campaign to manage the virus. This reluctance to get vaccinated is marked by delayed acceptance or total refusal, even with free available vaccine services (Soares et al., 2021). Several factors fuel this hesitancy, including issues of trust, a sense of complacency, the ease of getting vaccinated, evaluating risks against benefits, religious considerations, and a lack of sufficient knowledge. Furthermore, demographic elements such as gender and ethnic background have been linked to different degrees of hesitancy towards vaccines (Robinson et al., 2022; Moon et al., 2023). It is essential to tackle these issues to promote broad vaccine adoption, which is critical in controlling the spread of COVID-19 and lessening its impact on communities.

The Centers for Disease Control and Prevention (CDC)'s activation of the Emergency

Operations Center (EOC) in response to the COVID-19 pandemic underscores the gravity of the effect of the COVID- 19 pandemic worldwide, particularly in the United States (Dzigbede et al., 2020). This proactive step demonstrates the critical role of institutions in addressing significant public health challenges.  The CDC, recognizing the pandemic's severity, has consistently advocated for vaccination as the primary defense against the virus. In an effort to make COVID-19 vaccines widely available and equitable, the U.S. government implemented measures like Operation Warp Speed, ensuring free access to vaccines for the population (Sanger, 2020). This initiative is a hallmark example of a mass vaccination strategy aimed at curtailing the spread of the virus across the country.

Despite these efforts, vaccine hesitancy remains a significant challenge. A notable portion of the population has been reluctant or refused to get vaccinated against COVID-19. Various factors, including misinformation, distrust in institutions, and political beliefs, influence this hesitancy. Understanding these dynamics through the lens of the system theory as delineated by Easton (1955) allows for a comprehensive understanding of how various components of society interact and influence public health outcomes, particularly in the context of a global pandemic.

## 2.2    Socioeconomic factors and vaccine hesitancy

Understanding and acknowledging the importance of vaccines in preventing diseases is another key element that influences public trust. Addressing the factors influencing vaccine hesitancy implies evaluate the reasons and conditions prompting individuals to be skeptical about vaccine. The concept of 'influence' refers to the power to change or affect someone or something, and the concept of 'prevalence' indicates the proportion of a population affected by a particular condition at a specific time. In the case of vaccine hesitancy, influences are the factors that sway individuals' decisions regarding vaccination, and prevalence denotes the extent of hesitancy within a population. Research on vaccine hesitancy address the issue of trust not only in the health system but also in the health product (Sapienza & Falcone, 2022; Lenton et al., 2022). Trust in the safety and effectiveness of vaccines is a complex matter, shaped by various elements such as societal views on vaccine safety, their efficacy, and the recognized significance of vaccines. Studies show that although there is widespread belief in the efficacy and safety of COVID-19 vaccines, some parts of the population still maintain a level of distrust. This mistrust is often rooted in concerns about the rapid development and approval of these vaccines, as well as misinformation spreading through various channels.

Falcone et al. (2020) observe that the acceptance of drastic measures to limit the spread of the pandemic in the U.S. has been facilitated by a high level of trust in the government. Trust in government make people willing to wear mask, respect social distancing and self-quarantine in case of exposure (Falcone & Sapienza, 2023; Bollyky et al., 2022). However, in the case of the COVID-19 vaccine, efficacy belief has adversely affected vaccine acceptance. People's belief in the efficacy of COVID-19 vaccines in their ability to protect against the virus plays a crucial role in vaccine acceptance. This belief is often shaped by scientific evidence and public health messaging.

Safety has been a critical component of public trust in vaccines. Despite extensive research and data confirming the safety of COVID-19 vaccines (Mtei et al., 2023; Williams et al., 2022), misinformation and lack of awareness continue to fuel safety concerns among some individuals. Williams et al. (2022) find that spreading misinformation, mainly through social media and other digital platforms, has been a significant barrier to building trust in vaccine safety and efficacy. This has led to skepticism and hesitancy, even in the face of strong scientific evidence supporting vaccine safety and effectiveness.

Misinformation about natural immunity versus vaccine-induced immunity significantly contributes to vaccine hesitancy. The dissemination of false or misleading information regarding vaccine safety and efficacy can result in baseless fears and reservations. A common misconception is the belief that natural immunity is more effective than vaccination, without a proper understanding of the associated risks (CDC, 2021; Shen & Dubey, 2019). This issue is exacerbated by the way individual health perceptions are formed, often influenced by personal experiences and anecdotal evidence, which can take precedence over scientific facts and public health guidelines (Tuckerman et al., 2022).

While trust in vaccines is an essential factor influencing vaccine hesitancy, vaccine hesitancy is also intricately linked with various sociodemographic factors, each playing a role in shaping public attitudes towards vaccination. Research indicates that age, gender, and race significantly impact individuals' perceptions and acceptance of vaccines (Steinmetz, 2022). For example, older age groups are often less hesitant about vaccines, possibly due to a greater awareness of the

risks associated with infectious diseases. Gender differences also emerge, with men and women displaying varying degrees of vaccine hesitancy, influenced by societal roles and personal health beliefs. Racial and ethnic backgrounds further complicate the picture, as historical experiences with healthcare systems can affect trust and confidence in vaccines (Steinmetz, 2022; Litaker et al., 2021).

Education level and socioeconomic status are also critical in understanding vaccine hesitancy. Jantzen et al. (2022) find that people with higher educational attainment generally show greater vaccine acceptance, likely due to better access to reliable health information and an understanding of the science behind vaccines. Educated individuals are more likely to discern credible information from misinformation, a critical factor in the current age of digital media. On the other hand, lower education levels might be associated with increased susceptibility to misinformation and a lack of understanding of complex health information. Socioeconomic status affects access to healthcare resources, information, and the ability to make informed health decisions. Individuals from higher socioeconomic backgrounds typically have better access to healthcare services, can more easily navigate health systems, and are likely to be more informed about health interventions like vaccines. Conversely, lower socioeconomic groups may face barriers such as access to vaccination services or mistrust in healthcare providers, leading to increased hesitancy. These sociodemographic factors highlight the need for tailored communication and public health strategies. By acknowledging and addressing these diverse influences, health authorities can develop more effective campaigns to increase vaccine uptake and combat misinformation (Roy et al., 2022a).

Gender and race are also critical sociodemographic factors influencing vaccine hesitancy. Gender differences can influence vaccine attitudes due to biological, psychological, and societal reasons. For example, women may have specific concerns about vaccines during pregnancy or their impact on fertility, while men's attitudes might be influenced by different health behaviors and societal expectations. World Health Organization, 2003 highlights the importance of considering gender in health, pointing out that both biological and social factors contribute to differing health risks and outcomes between genders. Race and ethnicity bring additional layers of complexity, often intertwined with cultural beliefs, historical experiences, and systemic issues. The concept of race, defined as groups divided based on physical traits and shared ancestry, plays a role in how communities perceive medical interventions, including vaccines (Willis et al., 2021). Historical experiences, such as structural racism and unethical research practices, have led to a deep-seated mistrust of the healthcare system among Black, Indigenous, and People of Color (BIPOC) communities in the U.S. This mistrust is a critical driver in the reluctance to accept COVID-19 vaccines among these groups. Cultural perspectives, including collective versus individualistic societal values, also influence vaccine attitudes. For example, in collectivist cultures, the decision to vaccinate might be more community-oriented, while in individualistic societies, personal choice and autonomy play a more significant role. Research has shown that addressing these cultural nu- ances is crucial for improving vaccine acceptance in diverse populations (Richard-Eaglin & McFarland, 2022; Lee & Wu, 2023).

A complex interplay of various factors, including education, race, gender, age, and socioeconomic status, influences COVID-19 vaccine hesitancy. Political factors also play a crucial role in influencing health attitudes and behaviors. Political affiliations and ideologies can significantly influence individuals' trust in public health messages and willingness to accept the vaccine, adding another layer to addressing vaccine hesitancy (Soares et al., 2021; Marzo et al., 2023).

## 2.3   Politics and vaccine hesitancy

Stone (1997) suggests that to implement policies that cater to specific constituents effectively, decision- makers must categorize their constituents, especially in time of reelection, as argued by Mayhew (1974, 2004). This categorization often involves prioritizing values that will enhance their electoral prospects. Though not all classifications of people are racially motivated, there is a significant connection between one's race and their economic status, with minority groups more frequently found in lower economic levels. This economic division often impacts the approach of political parties (Reyes & Stanic, 1988). For example, the Democratic Party's advocacy for affirmative action and diversity initiatives could be a key factor in their substantial backing from African American communities due to these specific efforts citepcraig2014precipice, cameron1996majority.

The interplay between political leaders' ambitions to win elections and the resulting polarization among elites profoundly impacts public attitudes and behaviors. This effect is especially noticeable in the context of election structures and the impact of activists and political en-

gagement on policymaking, notably in areas like health policy. Although most people do not consciously apply political ideologies in their everyday actions, political factors like polarization, as observed by Converse (1964), do affect public health attitudes and behaviors to some extent.

The influence of political ideology on COVID-19 vaccine attitudes is a significant phenomenon in the United States. Studies have shown a clear correlation between political affiliation and vaccine hesitancy or acceptance, with individuals who strongly identify with the Republican Party tending to have lower vaccination rates (Reece et al., 2023; Robinson et al., 2022; Nkouaga, 2022). This trend is not just a simple preference but seems deeply rooted in the broader political and cultural views that align with the party's stance on health policies. The reasons for this could be manifold, ranging from distrust in government-led health initiatives to the influence of partisan media, which can sometimes promote skepticism about the efficacy and safety of vaccines. This alignment of political ideology with health choices demonstrates how deeply political beliefs can permeate aspects of daily life, including critical health decisions (Alemi & Lee, 2023).

Constituents are increasingly skilled at identifying ideological distinctions between political parties, with a rising belief that Democrats tend to be more liberal than Republicans (Abramowitz & Saunders, 2005). This heightened awareness influences not just political involvement but also preferences and behaviors related to health policy. As the general electorate becomes more alert to elite polarization, their diverse forms of political participation play a critical role in shaping the effectiveness of the policymaking process.

In the U.S. Congress, institutional polarization has manifested in varied approaches to handling the COVID-19 pandemic by Democrats and Republicans. Studies, such as the one by Green et al. (2020), reveal that Democrats have prioritized internal management and health-related aspects of COVID-19. In contrast, Republicans have focused more on economic reopening. This stark division in pandemic response strategies was especially evident during the 2020 U.S. presidential election, where the contrasting pandemic management philosophies of the major political parties significantly influenced public attitudes and behaviors towards the pandemic. The political narratives during this period mirrored these differing stances, further cementing the link between political ideology and public health policy preferences (Golos et al., 2022; Amlani et al., 2023).

Media, including both social and traditional platforms, significantly influences public opinion on vaccines. These media outlets are often the main source of information for many people, shaping their perceptions and beliefs about health interventions. In the context of COVID-19 vaccines, Zhang et al. (2023) found that misinformation and conspiracy theories spread through these channels have notably increased vaccine hesitancy. This misinformation includes exaggerated claims about side effects and baseless assertions about the vaccines' effectiveness, leading to public confusion and fear. Cascini et al. (2022) argue that social media, in particular, has become a hotspot for spreading such misinformation. Due to its algorithmic nature, social media can sometimes amplify unverified and incorrect claims, intensifying doubts and skepticism about vaccinations. Anti-vaccine activists, leveraging social media platforms like Twitter, have significantly impacted both the general public and political figures, fostering skepticism and resistance towards vaccination efforts (Hagen et al., 2022). This phenomenon is intertwined with political ideology, where an apparent dichotomy exists in vaccine acceptance rates; liberals tend to show a higher acceptance rate than conservatives (Block Jr et al., 2022). This difference in perception is not just a public opinion trend but is deeply rooted in the ideological underpinnings of these groups, reflecting broader political divides in the country (Golos et al., 2022; Skafle et al., 2022). Political factors, including election strategies, partisanship polarization, and political ideologies, have significantly shaped attitudes toward vaccine hesitancy. However, this paper underscores that political trust and engagement are potent factors influencing the acceptance of vaccines. Trust in government and political institutions emerges as a crucial element in the strategic phases of managing the pandemic and determining public response to vaccination campaigns.

## 3   Theory

Numerous studies have established a strong link between political ideology and COVID-19 vaccine hesitancy in the U.S. Vaccine skepticism is more prevalent among individuals with Republican affiliations than Democrats, a pattern influenced by factors such as partisan communication, political leaders' views on vaccines, and the impact of political beliefs on health choices. Over time, political leanings have increasingly influenced vaccine opinions, surpassing other demographic considerations like race or ethnicity. This trend, reflecting the

politicization of health measures like vaccination, has deepened the divide in pandemic response strategies and significantly affected public health outcomes in the U.S (Alemi & Lee, 2023; Lasher et al., 2022; Cao et al., 2022). While existing research highlights the influence of political affiliations and ideologies on vaccine hesitancy, it's essential to recognize that political engagement and awareness can positively impact health service acceptance, ultimately reducing vaccine hesitancy. This perspective is the one addressed in this research. Political trust, active participation, and informed involvement in political processes may lead to a better understanding and acceptance of public health measures, including vaccination. Hence, beyond just ideological leanings, political engagement plays a crucial role in shaping public attitudes toward health services and can be a critical factor in combating vaccine hesitancy.

## 3.1    Political engagement

Political engagement can be regarded as the emotional and cognitive involvement in political matters, encompassing aspects such as political knowledge, interest, opinions, or attitudes towards various political issues (Le & Nguyen, 2021). It reflects how individuals connect with the political world in terms of understanding and active participation (Weinschenk et al., 2021). This engagement is closely linked to political interest, as a heightened interest in politics naturally leads to greater involvement in political discourse and activities. Additionally, one's attitude towards political participation, whether through voting, activism, or other forms of civic engagement, is a direct extension of their level of political engagement. More politically engaged people tend to have a positive attitude towards participation, seeing it as a vital part of democratic processes and civic responsibility.

This paper highlights that an individual's political interest and attitude towards political participation, both fundamental elements of political engagement, are positively correlated with acceptance of the COVID-19 vaccine. Essentially, those more involved and interested in politics show greater acceptance of COVID-19 vaccination, suggesting a link between political activity and public health responsiveness.

### 3.1.1    Political interest

Political interest embodies an individual's deep-seated emotional and cognitive connection to political matters. This encompasses a spectrum of elements, including knowledge about politics, specific concerns, opinions, and overall attitudes toward political events and issues (Center for Civic Education: I. What are Civic Life, Politics, and Government? Last retrieved 12/23/2023).Political interest expresses how people interact with and relate to the political environment, involving an understanding of political processes and a commitment to active participation within them. Such interest typically comes with the anticipation that engagement in political discussions and activities will be rewarding, thereby nurturing an ongoing involvement in political affairs. According to Prior's (2019) research, political interest transcends being just a passive state; it requires active engagement in learning about politics and participating in political discussions. This active involvement in acquiring political knowledge and engaging in discourse is what makes political interest a dynamic and vital part of civic engagement. It is through this active involvement and pursuit that political interest becomes a dynamic force, influencing not only personal views but also contributing to the broader civic and democratic processes.

Global research consistently highlights the crucial role of political interest in fostering political participation and fortifying democratic structures. Around the world, individuals with a heightened sense of political interest are more likely to actively engage in a range of political activities, from casting votes to participating in political dialogues and movements. Such engagement is fundamental to the vitality of democratic systems, as it cultivates an informed and proactive citizenry, which is key to effective and responsive governance. Moreover, political interest is often linked to a more profound comprehension of governmental functions and political frameworks, thus enhancing the quality of political discourse and decision-making. The research conducted by Ekman and Amnå (2012) underscores this point, highlighting the importance of political participation and civic engagement in sustaining dynamic democracies. Furthermore, Levy and Akiva (2019) study points to the positive impact of fostering political interest, particularly among young people, in promoting democratic involvement and political efficacy. Ultimately, political interest serves not just as a reflection of an individual's engagement with political matters but also as a catalyst for societal transformation, contributing to the development of strong, participatory democratic processes globally.

This research explores the positive link between political interest and vaccine acceptance. It posits that individuals with greater political interest tend to be more willing to receive

vaccinations, such as the COVID-19 vaccine. This trend is likely due to these individuals being better informed and more understanding of the significance of vaccines in public health, which makes them less prone to falling for misinformation. Political interest creates a conducive environment for engagement with credible information sources and adherence to government policies, thus enhancing trust in scientific guidance and public health protocols. The **hypothesis proposed** is that in communities with increased political interest, vaccine hesitancy rates tend to be lower, as these populations are typically more knowledgeable and have greater confidence in scientific and government health recommendations.

### 3.1.2    Attitude toward political participation

The 'attitude towards political participation' concept in the United States is broad, encompassing diverse activities that demonstrate public engagement in politics. This includes voting, campaigning, volunteering for political organizations, and actively participating in political discourse (Sanders et al., 2016; Mackenbach & McKee, 2015). Such involvement is a cornerstone of democracy, providing a platform for individuals to voice their opinions and shape policymaking. The significance of this engagement extends beyond the realm of politics, influencing broader societal aspects. Brown et al. (2020) research underlines the critical role of democratic engagement, mainly through voting and other electoral activities, in fostering a robust and healthy democratic society. Their findings suggest that such participation has far-reaching implications, positively impacting various dimensions of public life, from social cohesion to individual well-being.

The relationship between attitudes towards political participation and health service acceptance is increasingly recognized in public health research. Studies, such as the one conducted by Albrecht (2022), have demonstrated a positive correlation between such engagement and improved psychological and physical health outcomes. This suggests that those actively participating in political processes will likely have a greater awareness and acceptance of health services. Their involvement in civic activities enhances their personal health and contributes to the community's overall health by promoting informed decisions regarding health services.

Furthermore, the connection between political engagement and health service acceptance under- scores the role of informed decision-making in health-related matters. Engaged citizens tend to be more informed about health policies, more trusting of medical advice, and more likely to utilize health services effectively. This receptiveness to health information and services stems from a broader under- standing of and engagement with societal issues, including those related to public health. Therefore, fostering political participation could be a strategic approach to improving health service acceptance and utilization, ultimately leading to better health outcomes at the individual and community levels.

**Hypothesis:** A positive attitude toward political participation is inversely related to vaccine hesitancy. This hypothesis posits that individuals actively engaged in politics and maintaining a positive view of such involvement are more inclined to accept vaccinations. This inclination stems from their likely better access to accurate information and greater trust in scientific and health authorities. Therefore, promoting positive political participation could be vital in reducing vaccine hesitancy. This approach aims to create an informed populace that appreciates the importance of vaccines for public health, leading to higher vaccine uptake and better health outcomes overall.

## 3.2    Political Trust

Political trust is a fundamental concept in political science, representing the public's confidence in their government and political system. It is often defined as a basic evaluative orientation towards the government, rooted in how well the government is perceived to operate and fulfill its responsibilities (Hetherington, 1998; Turper & Aarts, 2017). This trust encompasses several layers, including trust in specific government entities like the federal government and trust in the political system as a whole, as outlined by political theorist David Easton. Easton (1955) emphasized that trust in the political system is crucial for the legitimacy and stability of democratic governance. It reflects citizens' belief in the system's fairness, efficiency, and ability to uphold democratic values.

The concept of political trust significantly differs from political engagement. While political engage- ment refers to the active participation of citizens in the political process, such as voting, campaigning, or discussing political issues, political trust is more about the belief in the system's integrity and effectiveness (OECD: Trust in Government. Last retrieved 01/05/2024). Recent studies have explored the link between political trust and health service acceptance. This

emerging research suggests that higher trust in government and political systems can lead to greater compliance with public health policies and higher health service utilization rates. This connection high- lights the importance of fostering trust in political institutions for effective public health interventions and overall societal well-being (Stals et al., 2022; Nkouaga, 2022).

### 3.2.1   Trust in the political system

Trust in the political system is a critical concept in political science, referring to citizens' confidence and belief in the effectiveness, integrity, and fairness of their political institutions. Prominent political scientists, including Hetherington and Husser (2012), Hetherington and Globetti (2002), Hetherington (1998), Hetherington and Rudolph (2022), and Levi and Stoker (2000), define political trust as a basic evaluative orientation toward the government, centered on how well it is perceived to fulfill its roles and responsibilities. This trust is foundational for the legitimacy and functioning of democratic systems, as it reflects the public's belief in the system's ability to uphold democratic values and operate efficiently.

Trust in the political system is vital for the health of a democracy, playing an indispensable role in fostering public confidence in democratic processes. It acts as a bedrock for ensuring that citizens view their involvement as impactful and representative of their needs and expecta- tions. When trust in political institutions is strong, it encourages greater political participation, enhances the perceived legitimacy of government decisions, and fortifies the foundational social contract between the state and its people. Research in this field, such as that by Hetherington, underscores that heightened levels of political trust lead to increased citizen engagement with democratic institutions and adherence to democratic norms and procedures. This trust is instru- mental in ensuring that democracies function effectively, as it motivates citizen participation and upholds the integrity and accountability of political systems.

The significance of trust in political systems is magnified in health policy and politics, particularly in response to crises like the COVID-19 pandemic. As corroborated by numerous studies during the pandemic, elevated trust in political institutions is linked to heightened adherence to public health measures. For instance, research by Bargain and Aminjonov (2020) revealed that trust in government led to better compliance with COVID-19 mitigation measures, influencing mortality rates. Additionally, Kallemose et al. (2023) emphasizes that managing trust effectively has been vital in garnering public support for COVID-19 restrictions. This underlines that when people have confidence in their political system, they are more inclined to abide by health guidelines and endorse decisions from health authorities. Ultimately, this trust is indispensable for successfully implementing health policies and managing public health emergencies in an effective and fair way.

This research **hypothesis that**: a negative correlation exists between trust in the political system and COVID-19 vaccine hesitancy. The premise posits that individuals with greater confidence in their political structures tend to display lower reluctance in embracing COVID-19 vaccines. This correlation implies that bolstering political trust could be instrumental in elevating vaccine uptake, as it potentially strengthens public belief in the reliability and effectiveness of vaccines, alongside confidence in governmental competence in pandemic management. Therefore, cultivating and sustaining trust in political entities might play a pivotal role in diminishing vaccine hesitancy, thereby improving public health responses in times of crisis.

### 3.2.2   Trust in Federal Government

Federalism in the United States embodies a delicate balance of power between state and federal governments. At its core, federalism navigates the division of responsibilities across different governance levels, particularly evident in policy areas like health. This division leads to ongoing debates between those favoring more state autonomy (often conservatives) and those advocating for a more substantial federal role (typically liberals). Health policy, not explicitly enumerated as a federal power, often sees significant federal involvement, sparking debates about the appropriate level of government intervention, especially in crises like the COVID-19 pandemic.

Discussions surrounding federalism highlight the critical role of trust in federal institutions, especially during significant public health crises. This trust is distinct from a more general political trust. Political trust encompasses an overall confidence in the political system and its leaders. In contrast, trust in federal institutions is a more targeted concept, focusing on particular bodies such as the Centers for Disease Control and Prevention (CDC), Congress, the Presidency, and other specific federal entities. This kind of trust plays a pivotal role in shaping public responses to health policies and instructions issued by these institutions.

In particular, trust in federal health institutions becomes a decisive factor in how the public reacts to health emergencies and adheres to health guidelines. This trust influences public acceptance of measures like vaccinations, lockdowns, or other health directives during crises such as the COVID-19 pandemic. This form of trust is crucial because it reflects the public's belief in the capability and reliability of these institutions to manage health crises effectively and equitably.

During the COVID-19 pandemic, the role of federal health institutions became paramount. Trust in these institutions affected public adherence to health guidelines and acceptance of government strategies for managing the crisis. Institutions like the CDC became critical in conveying public health information and guiding policy responses. The effectiveness of these responses hinged significantly on the public's trust in the information and directives issued by these federal health entities.

Research suggests that trust in federal institutions is positively associated with support for health policies (Kowitt et al., 2017; Hetherington, 1998; Chanley, Rudolph and Rahn, 2000). This trust facilitates compliance with health directives and acceptance of vaccinations. Conversely, a lack of trust, fueled by mixed messages or perceived mismanagement, can lead to skepticism and hesitancy, particularly regarding vaccine uptake.

Based on this understanding, the **hypothesis** is that trust in federal institutions is inversely related to COVID-19 vaccine hesitancy. Higher levels of trust in these institutions likely correlate with lower levels of vaccine hesitancy, suggesting that enhancing trust in federal health institutions could be a key strategy in increasing vaccine uptake and managing public health crises effectively.

# 4    Methodology

## 4.1    Data Source and Sample Design

The Collaborative Multi-Racial Post-Election Survey (CMPS), conducted by UCLA, is a pivotal data source for understanding diverse sociopolitical attitudes in the United States. The survey's large sample size of approximately 15,000 respondents in its 2020 iteration lends considerable statistical power and representation. This expansive scale ensures the inclusion of substantial respondent segments from key racial groups such as Blacks, Latinos, and Whites. This is crucial for conducting comprehensive and nuanced racial comparisons regarding policy preferences and political attitudes. The CMPS's methodology, focused on capturing various perspectives across different racial demographics, makes it a rich dataset for analyzing complex sociopolitical dynamics in the U.S.

The principal investigators of the CMPS have employed advanced techniques to ensure that the data is representative of the broader U.S. population. These techniques include stratified sampling to accurately reflect the demographic composition of the nation, weighting procedures to adjust for potential sampling biases, and meticulous questionnaire design to elicit clear and meaningful responses. The rigor applied in collecting and processing the CMPS data enhances its credibility and makes it an invaluable resource for behavioral research. It provides a robust foundation for researchers to delve into how different racial groups perceive and interact with the political landscape.

Cross-sectional research using the CMPS data is particularly relevant for examining health attitudes and behaviors, such as vaccine hesitancy. The survey's comprehensive coverage of various sociode- mographic factors allows researchers to dissect how these factors intersect with political views and health-related behaviors. Given the heightened relevance of public health issues such as COVID-19, the CMPS data can illuminate how political interest, participation, and trust in government institutions influence health behaviors across different racial and ethnic groups. This insight is invaluable for public health professionals and policymakers seeking to address vaccine hesitancy and promote health equity in an increasingly diverse and politically complex society.

## 4.2    Main Variables

This research focuses on understanding health service acceptance, particularly in the context of COVID- 19 vaccine hesitancy. The pivotal dependent variable in this analysis is the level of hesitancy towards the COVID-19 vaccine among respondents, ascertained through the CMPS survey. This survey probed respondents on their attitudes towards the COVID-19 vaccine with a specific question: "When it comes to the new vaccine to protect against the coronavirus, which

comes closest to your view?" The responses were predetermined and included options like "I have already received the vaccine" (coded as 1), "I plan to get the vaccine as soon as I am able to" (coded as 2), "I am not sure about the vaccine, I want to wait a while" (coded as 3), and "I do not trust the vaccine, I do NOT plan to take it" (coded as 4). To quantify vaccine hesitancy, these responses were transformed into a binary variable. Responses indicating uncertainty or distrust towards the vaccine ("I am not sure about the vaccine, I want to wait a while" and "I do not trust the vaccine, I do NOT plan to take it") were coded as 1, representing vaccine hesitancy. Conversely, the other responses were coded as 0, indicating an absence of hesitancy. This coding method provides a precise, binary measure to assess the extent of vaccine hesitancy among the surveyed population.

In this study, I investigate the roles of political engagement and trust in political systems in shaping COVID-19 vaccine hesitancy. I quantify political engagement through variables that capture political interest and attitudes toward participation in civic and political activities. Specifically, political interest is assessed by asking respondents about their level of interest in politics, ranging from 'Not at all interested' to 'Very interested'. Similarly, the extent of pride felt in civic or political participation is gauged through a question with responses varying from 'none at all' to 'a lot'. Trust in the political system and federal health institutions is evaluated via separate questions. For the former, respondents are asked to express their agreement or disagreement with the statement, 'The political system helps people with their genuine needs'. In contrast, the latter are asked how often they trust the federal government to do what is right, with responses ranging from 'Never' to 'Always'.

This research includes controls for confounding variables to ensure robustness in the findings and rule out spurious correlations. Confounders are factors that could distort the proper relationship between the independent and dependent variables. For instance, partisanship, primary news sources, and demographic characteristics like age, education, gender, and employment status are considered. Moreover, I disaggregate the data by race to explore potential variations across different racial groups. Controlling for these confounders is crucial to isolate the effect of political engagement and trust on vaccine hesitancy, providing a more accurate understanding of their impacts. This approach aligns with the research methodologies used in political science and public health, exemplified by the work of Sallam (2021) and Sallam et al. (2021). Their research on COVID-19 vaccine hesitancy particularly highlights the critical need to include a diverse array of variables for a comprehensive understanding of the complex nature of vaccine hesitancy.

## 4.3   Data analysis

The investigation into COVID-19 vaccine hesitancy and its relation to political factors such as political interest, participation, and trust in the political system and federal government requires robust statistical methods. A t-test and logistic regression are particularly suitable for this analysis.

A t-test is a foundational statistical tool used to compare the means of two groups. In the context of vaccine hesitancy, it helps determine if there are significant differences in hesitancy levels between different racial groups. This is particularly relevant when considering the disproportionate impact of COVID-19 on different racial communities and varying levels of trust in government and healthcare systems. By disaggregating data by race, researchers can isolate and understand the specific impacts of race on vaccine hesitancy, revealing nuanced insights that might be obscured in a more generalized analysis.

Logistic regression, a type of regression analysis aimed at predicting the outcome of a category- based dependent variable through one or more independent variables, is well-suited for estimating the probability of vaccine hesitancy. This method can incorporate multiple variables, such as political interest, political participation, trust in the political system, and federal government while controlling for sociodemographic factors, partisanship, and media influence. Logistic regression's ability to handle continuous and categorical variables makes it a powerful tool for analyzing complex relationships where the outcome (vaccine hesitancy) is not a numerical value but a category (hesitant or not hesitant).

Weighting in logistic regression is crucial when the sample data may not perfectly represent the demographic makeup of the larger population. This technique ensures that the results are more representative, especially when examining diverse populations with varying access to information, healthcare, and political engagement. It also helps to mitigate any biases in the sample, providing a more accurate reflection of the population's attitudes towards vaccination.

The utilization of both t-tests and logistic regression in this context is backed by extensive research. Studies have shown that such methods effectively dissect complex relationships between behavioral factors and health outcomes. For example, political science and public health research have used these methods to explore how political affiliations and trust levels impact health behaviors, providing valuable insights into public policy and health communication strategies.

In conclusion, employing a t-test for racial group comparison and logistic regression to analyze factors influencing vaccine hesitancy offers a nuanced understanding of the interplay between political factors and public health responses. This approach aligns with current political science and public health research methodologies, providing a robust framework for analyzing COVID-19 vaccine hesitancy.

# 5  Results

Before conducting logistic regression analysis to examine the links between the primary variables of this study and reluctance to receive the COVID-19 vaccine, this research first undertook a detailed analysis of the bivariate relationships. This involved individually assessing how each independent variable within our model associates with COVID-19 vaccine hesitancy, thereby establishing foundational insights for more complex analytical processes. In the analysis utilizing the t-test (Table 1), the study revealed significant differences in mean values of trust in federal institutions and COVID-19 vaccine hesitancy across different racial groups. In the full model, the mean difference was -0.34 with a p-value of 0.001, indicating a statistically significant relationship. When disaggregated, the model for Black respondents showed a mean difference of -0.36 (p-value = 0.001); for Latinos, the mean difference was -0.30 (p-value = 0.001), and for Whites, the difference was -0.31 (p-value = 0.001). These results indicate a consistent negative relationship between trust in federal institutions and vaccine hesitancy across all examined groups, albeit with varying magnitudes.

**Table 1**  Summary statistic: t-test IVs by Vaccine Hesitancy (Collaborative Multiracial Post-Election Survey, CMPS)

| Variable | Full (n = 13471) | | Blacks (n = 3643) | | Latinos (n = 3612) | | Whites (n = 2656) | |
|---|---|---|---|---|---|---|---|---|
| | Diff in Mean | P-values | Diff in Mean | P-values | Diff in Mean | P-values | Diff in Mean | P-values |
| Trust in Federal Institutions | -0.34 | 0.001 | -0.36 | 0.001 | -0.3 | 0.001 | -0.31 | 0.001 |
| Trust in the Political System | -0.26 | 0.001 | -0.27 | 0.001 | -0.21 | 0.001 | -0.29 | 0.001 |
| Political Interest | -0.31 | 0.001 | -0.43 | 0.001 | -0.31 | 0.001 | -0.33 | 0.001 |
| Political Participation | -0.36 | 0.001 | -0.64 | 0.001 | -0.26 | 0.001 | -0.28 | 0.001 |
| Democrats | -0.18 | 0.001 | -0.21 | 0.001 | -0.26 | 0.001 | -0.28 | 0.001 |
| Republicans | 0.07 | 0.001 | 0.03 | 0.001 | 0.06 | 0.001 | 0.13 | 0.001 |
| CNN | -0.47 | 0.001 | -0.42 | 0.001 | -0.46 | 0.001 | -0.53 | 0.001 |
| Fox News | 0.12 | 0.001 | 0.16 | 0.001 | 0.14 | 0.01 | -0.01 | 0.9 |
| Female | 0.04 | 0.001 | -0.01 | 0.6 | 0.04 | 0.07 | 0.14 | 0.001 |
| Age | -0.67 | 0.001 | -0.94 | 0.001 | -0.59 | 0.001 | -0.78 | 0.001 |
| Education | -0.77 | 0.001 | -0.56 | 0.001 | -0.55 | 0.001 | -0.78 | 0.001 |
| Unemployment | 0.05 | 0.001 | 0.01 | 0.7 | 0.1 | 0.001 | -0.04 | 0.08 |
| Whites | 0.06 | 0.001 | | | | | | |
| Blacks | 0.13 | 0.001 | | | | | | |
| Latinos | 0.01 | 0.7 | | | | | | |

Utilizing multiple logistic regression analysis while controlling for confounding variables such as partisanship, media consumption (CNN or Fox News), and socioeconomic status (Table 2), the study examined the impact of trust in federal institutions on COVID-19 vaccine hesitancy. The analysis yielded significant results across all racial groups. In the full model, the logistic regression score was -0.4 (p-value = 0.001), indicating a strong negative relationship between trust in federal institutions and vaccine hesitancy. Disaggregating by race, the model for Black respondents showed a logit score of -0.42 (p-value = 0.001), for Latinos -0.37 (p-value = 0.001), and for Whites -0.37 (p-value = 0.001). These findings suggest a consistent pattern across different racial groups, where increased trust in federal institutions correlates with reduced vaccine hesitancy.

The t-test analysis of the relationship between trust in the political system and COVID-19 vaccine hesitancy demonstrated significant findings. In the full model, the mean difference was -0.26 (p-value = 0.001), indicating a negative correlation between trust in the political system and vaccine hesitancy. When the data was disaggregated by race, the results were as follows: for Blacks, the mean difference was -0.27 (p-value = 0.001); for Latinos, -0.21 (p-value = 0.001),

**Table 2**  Logistic regression: Vaccine hesitancy

| Variable | Full Model | Blacks | Latinos | Whites |
|---|---|---|---|---|
| Intercept | 2.40*** | 3.08*** | 1.62*** | 3.44*** |
|  | (0.16) | (0.27) | (0.29) | (0.33) |
| Trust in Federal Institutions | -0.40*** | -0.42*** | -0.37*** | -0.37*** |
|  | (0.05) | (0.08) | (0.08) | (0.10) |
| Trust in the Political System | -0.14*** | -0.18** | -0.10 | -0.15 |
|  | (0.04) | (0.07) | (0.08) | (0.09) |
| Political Interest | -0.11** | -0.13* | -0.12 | -0.05 |
|  | (0.03) | (0.06) | (0.06) | (0.06) |
| Attitude to Political Participation | -0.12*** | -0.24*** | -0.01 | -0.15** |
|  | (0.03) | (0.04) | (0.05) | (0.05) |
| Republicans | 0.38*** | 0.11 | 0.27 | 0.40** |
|  | (0.08) | (0.19) | (0.14) | (0.13) |
| Democrats | -0.46*** | -0.38*** | -0.31** | -0.75*** |
|  | (0.07) | (0.10) | (0.12) | (0.18) |
| CNN | -0.24*** | -0.14** | -0.26*** | -0.36*** |
|  | (0.03) | (0.05) | (0.05) | (0.06) |
| Fox News | 0.17*** | 0.20*** | 0.22*** | 0.08 |
|  | (0.03) | (0.04) | (0.05) | (0.05) |
| Female | 0.26*** | 0.24* | 0.13 | 0.52*** |
|  | (0.06) | (0.09) | (0.10) | (0.11) |
| Age | -0.32*** | -0.32*** | -0.29*** | -0.39*** |
|  | (0.02) | (0.03) | (0.04) | (0.04) |
| Education | -0.16*** | -0.12*** | -0.15*** | -0.25*** |
|  | (0.02) | (0.03) | (0.03) | (0.04) |
| Unemployment | 0.20** | 0.17 | 0.34** | -0.09 |
|  | (0.06) | (0.10) | (0.11) | (0.12) |
| Asian/Pacific/Native | -1.02*** |  |  |  |
|  | (0.10) |  |  |  |
| Blacks | 0.65*** |  |  |  |
|  | (0.08) |  |  |  |
| Latinos | -0.16* |  |  |  |
|  | (0.08) |  |  |  |
| Deviance | 12435.85 | 3922.21 | 3616.06 | 2623.86 |
| Dispersion | 0.98 | 0.97 | 0.97 | 1.01 |
| Num. obs. | 13471 | 3643 | 3612 | 2656 |

**Note:** *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

and Whites, -0.29 (p-value = 0.001). These results align with previous findings regarding trust in federal institutions, further emphasizing the role of trust in governance in influencing public health decisions.

In the analysis utilizing multiple logistic regression, the overall model showed a logit score of -0.14 (p-value = 0.001), suggesting a negative relationship between trust in the political system and vaccine hesitancy. When disaggregated by race, the model for Black respondents indicated a logit score of -0.18 (p-value = 0.001), demonstrating a stronger negative relationship in this group. However, for Latinos and Whites, the logit scores were -0.10 and -0.15, respectively, with the p-values not being statistically significant. This suggests that the relationship between trust in the political system and vaccine hesitancy is less pronounced or non-significant in these groups.

In examining the role of political interest in COVID-19 vaccine hesitancy, the t-test analysis revealed significant differences across racial groups. A mean difference of -0.31 (p-value = 0.001) was observed in the full model, suggesting a general trend where increased political interest correlates with lower vaccine hesitancy. Disaggregating the data, this trend became more pronounced for Black respondents, with a mean difference of -0.43 (p-value = 0.001), while for Latinos and Whites, the mean differences were -0.31 and -0.33, respectively, with p-values of 0.001. These findings indicate a stronger correlation between political interest and vaccine hesitancy among Black respondents than other groups.

In the multiple logistic regression analysis investigating the influence of political interest on COVID- 19 vaccine hesitancy, the full model yields a logit score of -0.11 with a p-value of 0.01. This suggests that increased political interest is associated with a decrease in vaccine hesitancy. When examining racial groups separately, the analysis for Black respondents shows a more pronounced effect, with a logit score of -0.15 and a p-value of 0.05. This indicates a stronger relationship between political interest and vaccine hesitancy in this group. However,

the logistic regression analysis results for Latino and White respondents are not statistically significant, with logit scores of -0.12 and -0.05, respectively. These findings imply that while political interest plays a role in vaccine hesitancy, its impact varies across racial groups.

The t-test analysis focusing on attitude toward political participation as a predictor of COVID-19 vaccine hesitancy revealed significant racial disparities. In the full model, the mean difference was -0.36 with a p-value of 0.001, indicating a general trend where greater political participation correlates with lower vaccine hesitancy. This trend was most pronounced among Black respondents, with a mean difference of -0.64 (p-value = 0.001). The mean differences for Latinos and Whites were comparatively lower, at -0.26 and -0.28, respectively, with p-values of 0.001. These results suggest a stronger relationship between political participation and vaccine hesitancy in the Black community compared to other racial groups.

The multiple logistic regression analysis conducted to understand the influence of attitude toward political participation on COVID-19 vaccine hesitancy produced insightful results. The overall model revealed a significant negative logit score of -0.12 (p-value = 0.001), indicating a general trend where increased political participation correlates with decreased vaccine hesitancy. This trend is significantly more pronounced in the Black community, with a logit score of -0.24 (p-value = 0.001). In contrast, the results for Latinos and Whites were less significant, with logit scores of -0.01 and -0.15, respectively. These findings mirror the earlier t-test analysis, where Black respondents' mean difference was notably higher at -0.64 (p-value = 0.001) compared to Latinos and Whites. The logistic regression analysis adds depth to these findings by accounting for confounders and reinforcing the observed trend.

Figure 1 shows the predicted values of vaccine hesitancy based on various political and trust variables, such as Trust in Federal Institutions, Political Interest, Trust in the Political System, and Attitude to Political Participation. Each plot demonstrates a clear negative relationship between the independent variable (on the x-axis) and vaccine hesitancy (on the y-axis), as indicated by the downward-sloping blue regression lines. The effect size remains consistent across all plots, indicating that vaccine hesitancy decreases as trust or interest increases. The shaded areas represent the confidence intervals, indicating a higher degree of uncertainty at lower levels of trust or interest. However, overall, the effect appears robust across the different variables. This suggests that higher trust in institutions and greater political engagement are associated with lower levels of vaccine hesitancy.
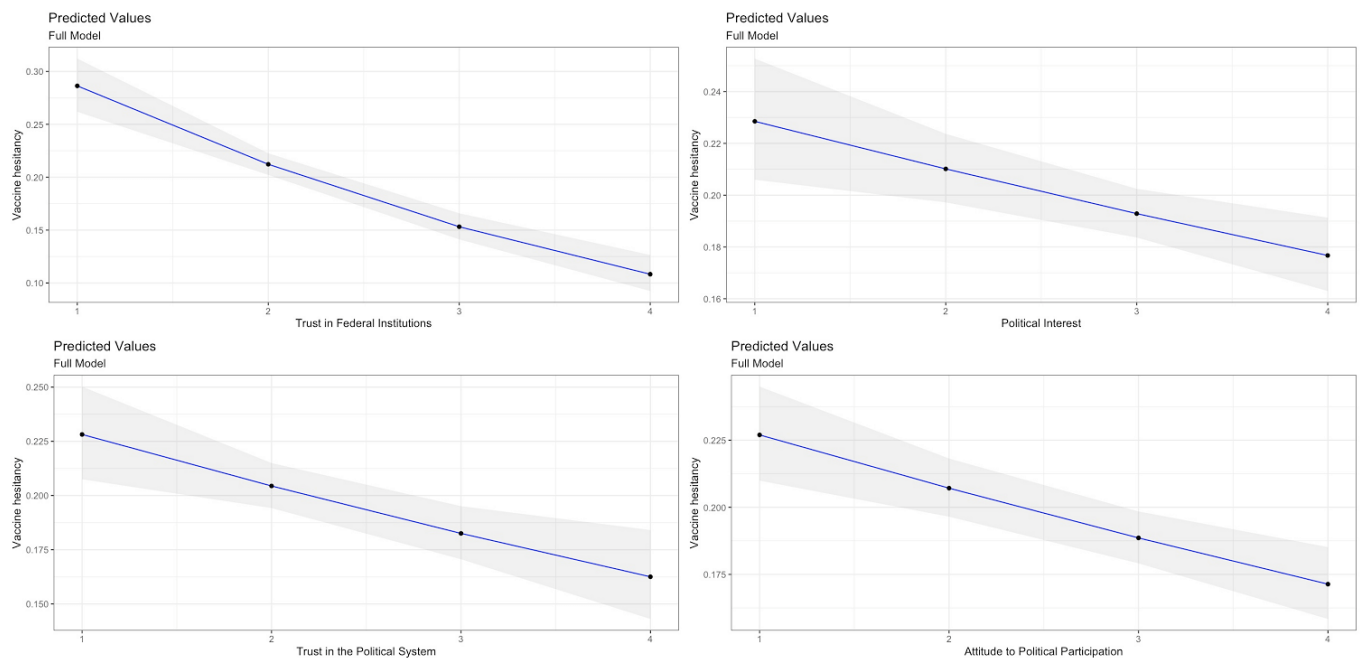


**Figure 1**   Predicted probabilities (Author's analysis)

The logistic regression model was assessed using the Hosmer-Lemeshow goodness-of-fit test (Table 3), which resulted in a chi-square value of 11.574 with 8 degrees of freedom and a p-value of 0.1712. This suggests that the model adequately fits the data. The model's fit was further evaluated using several pseudo-R-squared measures. Nagelkerke's R-squared was found

to be 0.41, indicating that the model explains 41% of the variance in the adoption of automatic payment systems, showing a moderate fit. The likelihood ratio test confirmed that the model is superior to the null model ($\chi_2 = 4584.4$, $p < 0.001$), indicating that the included predictors significantly enhance the model's explanatory power. However, there is a difference in the number of observations between the full model (13,471) and the null model (14,988), which requires further investigation to ensure the consistency and validity of these results.

**Table 3**   Hosmer-Lemeshow test & Nagelkerke R-squared

| Measure | Value | Description |
| --- | --- | --- |
| Pseudo R-squared for Model vs. Null | | |
| McFadden's R-squared | 0.280133 | Explains 28.0% of variance |
| Cox and Snell's R-squared | 0.288456 | Explains 28.8% of variance |
| Nagelkerke's R-squared | 0.410179 | Explains 41.0% of variance |
| Likelihood Ratio Test | | |
| Difference in Df | -15 | Change in degrees of freedom |
| Difference in Log-Likelihood | -2292.2 | Difference in model likelihood |
| Chi-square Statistic | 4584.4 | Model vs. null comparison |
| p-value | 0 | Full model is significantly better |
| Hosmer-Lemeshow Goodness of Fit Test | | |
| Chi-square Statistic | 11.574 | Evaluates the goodness of fit |
| Degrees of Freedom | 8 | Based on 8 groups |
| p-value | 0.1712 | Indicates model fits the data well |
| Number of Observations | | |
| Full Model | 13,471 | Observations used in the full model |
| Null Model | 14,988 | Observations used in the null model |

The evaluation of multicollinearity in the logistic regression model is shown in Figure 2, which presents the Adjusted Variance Inflation Factor (VIF) values for each predictor. All VIF values are signifi- cantly lower than the commonly accepted threshold of 5, with the highest value being approximately 1.3. This indicates that multicollinearity is not a concern in the model, confirming that the predictors are adequately independent and not highly correlated. The absence of significant collinearity among the independent variables supports the reliability of the model's estimates and suggests that the increase in variance due to multicollinearity is minimal.
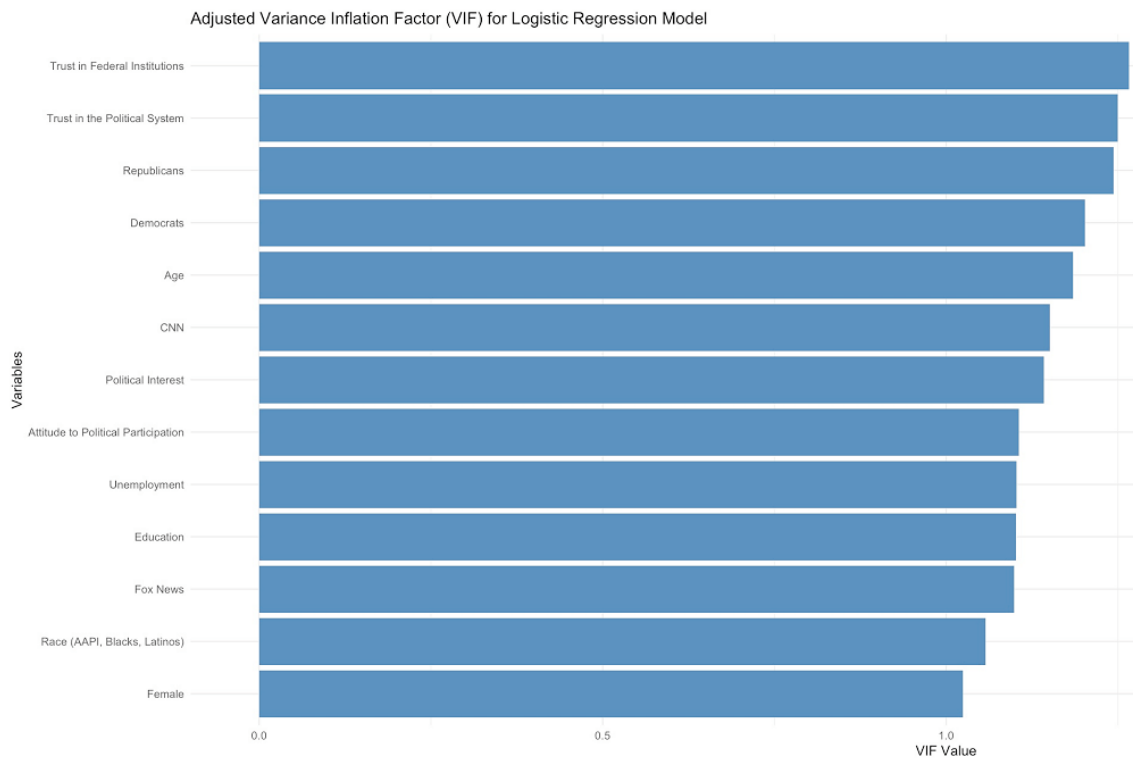


**Figure 2**   Adjusted variance inflation factor (VIF) for logistic regression model (Author's analysis)

# 6   Discussion

The initial phase of this study, which focused on examining the relationship between each independent variable and COVID-19 vaccine hesitancy, yielded important insights for the subsequent logistic regres- sion analysis. The t-test analysis revealed significant disparities in vaccine hesitancy among different racial groups, indicating that higher trust in federal institutions generally corresponds to lower levels of hesitancy, particularly among Black respondents. However, this relationship was less pronounced among Latinos. These findings highlight the significance of tailored public health policies that address the unique concerns of various racial groups.

The logistic regression analysis, taking into account variables such as partisanship and media consumption, reaffirmed the inverse relationship between trust in federal institutions and vaccine hesitancy observed in the t-tests. This dual-method approach underscores the importance of institutional trust in shaping vaccine attitudes and provides a probability-based perspective that incorporates other socio-political factors. The results suggest that fostering trust in federal health institutions through clear, consistent, and scientifically grounded communication is crucial for effective public health management. The study also revealed the critical role of political trust and engagement in vaccine hesitancy, with noticeable differences across racial groups. The negative correlation between political trust and hesitancy was most prominent among White respondents, while logistic regression indicated that other factors might have a greater influence on Latinos and Whites. These insights underscore the need for public health strategies that consider the complex interplay of political engagement, racial identity, and vaccine hesitancy.

Furthermore, there was a significant association between political affiliation and vaccine hesitancy, with Democrats generally displaying lower levels of hesitancy compared to Republicans. This aligns with previous research linking political ideology to health behavior and emphasizes the importance of bipartisan public health campaigns to reduce vaccine hesitancy across the political spectrum (Mesch & Schwirian, 2015a; Mesch & Schwirian, 2015b; Khubchandani et al., 2021; Duello et al., 2021; Ruiz & Bell, 2022; Jennings et al., 2023).

Educational level emerged as another critical factor influencing vaccine hesitancy, with higher levels of education being associated with lower levels of hesitancy across all racial groups. This finding underscores the importance of educational interventions in public health strategies, as supported by studies such as Roy et al. (2022b), Savoia et al. (2021), and Montuori et al. (2023). By addressing educational disparities and enhancing public health literacy, more effective strategies can be developed to combat vaccine hesitancy and improve health outcomes among diverse populations.

In conclusion, this study provides a comprehensive analysis of the multifaceted factors influencing COVID-19 vaccine hesitancy, highlighting the roles of institutional trust, political engagement, and education. These insights are invaluable for developing targeted public health interventions that address the specific needs of diverse demographic groups.

# 7   Conclusion

This research highlights the complex relationship between policymaking and public health, particularly in the context of the COVID-19 pandemic. Policymaking, as described in Stone's (1997) "Policy Paradox," is intricate and influenced by political ideologies, societal values, and competing interests. The study emphasizes the significant impact of political beliefs, trust in federal institutions, and political participation on vaccine hesitancy, with notable variations among racial groups, especially among Black respondents. These findings underscore the importance of considering diverse political and trust dynamics when designing public health interventions. Effective communication strategies that resonate with different political and racial groups are crucial for building political trust, improving public health responses, and fostering the acceptance of health interventions across diverse communities.

## Data availability statement

The data supporting the findings of this study are openly available. The 'Collaborative Multiracial Post-Election Survey (CMPS)' data is available for public use and can be accessed at CMPS Survey website and ICPSR. This research was self-funded by the authors.

# Conflict of interest statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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