

Politics in the Medical Field: An In-Depth Analysis of Political Polarization and its Influence on Vaccine Efficacy in Urban Metropolitan Areas

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Abstract

Vaccine hesitancy has become a significant public health issue anew, worsened by political polarization and misinformation. My study aims to investigate this issue by examining the medical implications of political campaigns on vaccine hesitancy. I utilized a mixed-methods approach, involving qualitative surveys and quantitative correlation and regression studies to analyze the relationship between political polarization and vaccine refusal. Surveys were conducted with adults in the greater Houston area using systematic random sampling. My findings revealed a moderate positive correlation with a correlation coefficient of 0.462 between political campaigns and vaccine hesitancy, suggesting that individuals with stronger political inclinations showed stronger vaccine skepticism. Age-related differences also emerged from the regression analysis, where younger individuals claimed personal preference in vaccination decisions while older respondents exhibited greater trust in medical professionals, such as their doctors. This supports the hypothesis that political polarization has contributed to vaccine hesitancy by causing distrust in medical institutions and aligns with the existing body of literature in the field of healthcare research. While my research provides useful insights, limitations such as sample size and the inability to establish objective and direct causation indicate the need for further longitudinal and experimental studies in future research.

Keywords: Vaccine; Medicine; Vaccine Hesitancy; Ethics; Politicization

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Introduction

Vaccine hesitancy has long been and remained an underlying and unaddressed issue in society. As Danielle Ofri of the New York Times puts it, "Vaccine hesitancy is only getting worse" [1]. The World Health Organization has defined vaccine hesitancy as a delay in acceptance or refusal of safe vaccines despite the availability of vaccination services [2]. This issue has recently been exemplified by the COVID-19 vaccine, in which studies found unvaccinated individuals were 32 times more susceptible to death from COVID-19 than vaccinated individuals [3]. Despite this, more than 30 million people remain unvaccinated against COVID-19 in the US [4].

Historically speaking, vaccine hesitancy was a relatively minor concern up until modern times [5]. For instance, the smallpox

vaccine was introduced in France after a quick review by a Vaccination Committee, and the majority of the population had been vaccinated within a year [6]. This empirical evidence shows that vaccine refusal had not been an issue in the 1800s, as considerably fewer people questioned either the ethicality or efficacy of the smallpox vaccine, emphasizing the recency and short time frame of the emergence of vaccine hesitancy. A historical analysis of vaccine acceptance in different societies revealed that the medical community once held a place of high trust among the general populace. When Edward Jenner first introduced the smallpox vaccine in the late 18th century, the medical community and government worked in tandem to distribute vaccinations without widespread public resistance [7]. Public campaigns successfully encouraged large-scale participation, and concerns over vaccine safety or efficacy were

relatively rare. In contrast, modern-day vaccine hesitancy has grown, largely due to misinformation and the politicization of medical science. The expansion of digital media has allowed misinformation to proliferate, contributing significantly to vaccine hesitancy [8]. The contrast between historical vaccine adoption and modern vaccine skepticism showcases the significance of understanding the factors that contribute to vaccine hesitancy today.

Such findings and observations of the past and their difference to the status quo lead me to my question: "What are the medical implications of political campaigns on vaccine hesitancy?" As politics became more intertwined with the healthcare field, more people began to distrust their local healthcare providers and hospitals due to their connection with the government. This leads me to hypothesize that the stronger divide within our nation that politics have caused has driven the divide and distrust in the medical field as well. My study aims to determine and establish a relationship between vaccination refusal and political campaigns in urban areas. This study also addresses a gap in the current body of knowledge as there currently is not any relationship established between vaccine hesitancy and politicization beyond the context of the COVID-19 pandemic. Testing this possible relationship is important to fill this gap and provide a new understanding that can be used in future policy decisions and research and development.

Literature Review

A further review of the existing body of knowledge finds various studies that have indicated multiple reasons for the rise of vaccine hesitancy in the 21st century. A cross-sectional study conducted by Lulin Zhou at Jiangsu University established a correlation between media exposure and vaccine hesitancy, perhaps indicating that vaccine hesitancy is being influenced by things beyond one's own opinions [9]. However, all these examples share the common trait of politics. Political populism, as defined by Encyclopedia Britannica, is a political program or movement that champions, or claims to champion, the common person, usually by favorable contrast with a real or perceived elite or establishment [10]. Striking similarities exist between the traits of political populism and the causes of vaccine hesitancy. In fact, a statistical study conducted by University of London professor Jonathan Kennedy concluded that there is a statistically significant relationship between political populism and vaccine refusal "at the 10% level" [11] emphasizing the relationship between politics and the number of vaccinations.

Historically, studies show the optimism and trust that citizens felt toward vaccines and their creation process. Award-winning veterinarian Cynthia Mills writes in an article for *Sciences* about the creation of the rabies vaccine and how it was rapidly adopted throughout the world following its creation [12]. Furthermore, anthropologist and archaeologist Samuel Wilson, in an issue of the *Natural History Journal*, examines the work of Francisco Xavier Balmis [13]. In 1806, Balmis led a major vaccination campaign in the Spanish colonies, aiming to vaccinate millions of new inhabitants from Asia and Spanish America against smallpox. Balmis' mission showcases one of the many efforts in the global fight against smallpox. Mills and Wilson's research showcases the

immediate positive regard felt towards new vaccines historically and the value people felt toward them. This further exposes the issue of vaccination in the modern day. In fact, Director of Science at Pew Research Center Cary Funk states that "Americans provide mixed assessments of the value and potential risks of these vaccines" [14]. Further statistical analysis showed "a sign of limited public enthusiasm for COVID-19 vaccines." These findings highlight the pervasiveness of vaccine hesitancy in modern-day society. A more recent study conducted by Oluwatosin Goje and other MDs and colleagues analyzes how vaccine hesitancy correlates with various socioeconomic factors, including education level, access to healthcare, and religious beliefs [15]. Their findings suggest that individuals with lower levels of formal education are more likely to question the efficacy and safety of vaccines.

Additionally, individuals residing in communities with limited healthcare access often receive less exposure to pro-vaccine messaging, leading to increased hesitancy. The study also points to the role of religious belief systems in vaccine skepticism, noting that some communities frame vaccine refusal as an issue of personal liberty. These observations suggest that vaccine hesitancy is a complex issue influenced by multiple societal and personal factors beyond just political affiliation. At this period in time, research regarding vaccine hesitancy has focused mostly on its relationship within the biological field itself and less on its effects on society as a whole. For instance, an article by neuroepidemiologist Aaron Rothstein revealed deep-seated tensions regarding the safety and necessity of vaccines [16].

While some argue that attacking critics may be counterproductive, research shows that simply providing more information often fails to persuade vaccine-hesitant parents. This study exemplifies the currency of the issue of vaccine hesitancy. However, the recency of this study puts doubt on its relevance, as vaccine hesitancy went into a much larger transformation under the spotlight during the COVID-19 pandemic. University of Western Australia professor Katie Attwell explores this idea of the safety of vaccines more deeply. In an article for *Milbank Quarterly* in 2019, Attwell explains the connection between mandatory childhood vaccinations and future mistrust in medicine [17]. Attwell concludes that factors such as scope, sanctions, and severity affect the way policies engender vaccination. Attwell and Rothstein's findings help solidify the relationship between politics and vaccine hesitancy, further demonstrating an issue in the status quo that has continued to be ignored. Attwell also suggests more extensive research into vaccine hesitancy in general, highlighting the significance of our research.

Assistant Professor at the University of North Texas Christopher Long further examines the attitude and stigma surrounding the scientific field. The author conducted an experiment in which elementary students took a test regarding their thoughts on science before and after they took a "senior-level science teaching methods course" [18]. Using a statistical T-test, the author found a statistically significant increase in attitude regarding science after taking the course. Long's findings suggest that issues with trust in the scientific field stem from childhood rather than nurture, which could explain the decrease in vaccinations as history progressed. Although Long's study is broader, focusing

on science itself rather than just medicine, his findings are still applicable to our research as Attwell's research connects the biomedical field to the scientific field of inquiry in the context of childhood 'nature.'

Recent measles and polio outbreaks serve as stark reminders of the consequences of vaccine hesitancy. A 2024 measles outbreak in West Texas, as reported by Teen Vogue, illustrates how misinformation and conspiracy theories can lead to real-world health crises. In this case, anti-vaccine rhetoric contributed to a decline in vaccination rates, allowing a disease that was once extinct in the U.S. to resurface [19]. The outbreak resulted in numerous infections and at least one reported fatality, highlighting how vaccine hesitancy can pose a direct threat to public health. Measles, a highly contagious disease, requires near-total immunization coverage to prevent outbreaks, making even small declines in vaccination rates dangerous. Additionally, recent polio outbreaks worldwide have showcased the critical importance of maintaining high vaccination coverage worldwide and the dangers of the effects of vaccine hesitancy. In 2022, Malawi and Mozambique reported cases of wild poliovirus type, marking a dire resurgence of a rare and nearly dead disease in the African region (GEI, 2024). Specifically, nine children were paralyzed across both countries between February and August 2022.

Similarly in the United States, a case of polio was confirmed in Rockland County, New York, in July 2022. Notably, polio vaccination among infants and children under 24 months in Rockland County had declined from 67.0% in July 2020 to 60.3% by August 2022, with some areas reporting coverage as low as [20]. 37.3% This decline in immunization directly leading to a virus outbreak highlights both the importance of vaccination as well as the deadly and disastrous outcomes that society faces due to a lack of vaccination.

Method

Method overview

My methodology comprises two fundamental aspects: a survey distribution to gather data regarding the present-day manifestation of vaccine hesitancy along with an analysis of the data acquired through a mixed method approach involving both a correlational study and a trend analysis. This dual structure allows for a multifaceted exploration of the issue, leveraging both qualitative and quantitative aspects to provide a well-rounded conclusion. Additionally, my method aims to gather and evaluate people's beliefs about vaccine hesitancy and how it has progressed over time, along with the political changes that have been made. Analyzing other trends in my data such as age and prior political belief is also important for both analyzing the effects of confounding variables on the results of my study as well as synthesizing a causation factor between vaccine hesitancy and political campaigns which has not yet been revealed in the current body of knowledge. This process was deemed appropriate and ethical by an institutional review board, ensuring that my work did not violate any ethical rules or boundaries.

Data collection

The first step of my method was gathering data to draw analysis from in the form of a survey of adults. This part of the study is informed by the work of Cary Funk, who examined public distrust in vaccine safety and the underlying tensions within medical discourse utilizing a survey and analyzing the results with statistical analysis. While previous research has explored public perceptions of vaccines, there is a gap in the literature explicitly connecting vaccine hesitancy to political polarization. My research seeks to fill this gap by conducting surveys with adults in the greater Houston area that directly address the intersection of political ideology and vaccine skepticism. Participants were to be strangers or people I was not familiar with, in order to avoid sampling and response bias, and comprised mostly adults ages 20-60.

This age range was chosen since people between 20 and 60 can vote and are often the ones who vote the most [21]. A survey was chosen as a way to quickly gather data from a large number of people, allowing me to be efficient in my data collection as well as providing me more time to analyze the data after it was gathered. To recruit participants, I employed a systematic random sampling strategy in which a sample is taken from a fixed interval of a population, approaching individuals in public spaces such as parks and supermarkets. By incorporating a sample that mostly excluded individuals from my personal network, I minimized selection bias and ensured greater diversity in perspectives. Before participation, all individuals were informed of the study's purpose, assured of confidentiality, and given the option to withdraw at any time. I carefully designed the survey questions to avoid bias and leading language based on the instruction of researchers Choi and Pak of the University of Toronto and their findings regarding survey bias [22].

Questions were framed neutrally to encourage honest responses, and they covered topics such as personal vaccination history, trust in government health agencies, and perceptions of political influence in medical decisions (Appendix A). To enhance the depth of responses, I incorporated Likert scale questions, allowing participants to rate their views on a scale from 1 to 5. In a Likert scale survey, respondents are asked a question and then asked how strongly they felt about their answer to the last question, with 1 being not very sure and 5 being very passionate and certain. This approach provided a more in-depth understanding of attitudes toward vaccine hesitancy rather than a simple one-dimensional response format. Participants were also informed of the nature of the questions that were going to be asked and provided consent through the signature of a consent form before being admitted to take the survey (Appendix B). Responses to these questions were categorized into:

1. Yes, politics should play a role in vaccine development
2. Neutral
3. No, politics should not play a role in vaccine development

Using a scale devised from the study of health scientist Boateng and colleagues, I quantified the strength of the statement made by the participant and graphed these values along the x-axis [23]. I employed thematic coding techniques in which recurring

themes—such as distrust in governmental institutions, concerns about vaccine safety, and perceived infringement on personal liberties—were identified and categorized as a constant when assigning the values of my scale. The participant's average Likert scale response across the survey was then added to the total number in the category under which their response fit and graphed along the y-axis. The following table is an abbreviated example of what was used to categorize and organize the data (Appendix C) (Figure 1).

The sign of the numerical total value was used to conclude this aspect of the method. For instance, a “yes” response with a Likert scale answer of 5 added five points to the total value. However, a “no” response with a Likert scale answer of 3 subtracted three points from the total value. If the final value was positive, then it was concluded that for that age group, more people preferred politics to play a role in vaccine development than not and vice versa. The further away the total value was from 0, the stronger the opinions of the people in that age group were. This

was done so that individuals with more clarity and therefore a stronger belief in vaccine hesitancy and its potential causes were given more weight in the study than those who were rather unaware of vaccine hesitancy. Afterward, these values were run through a statistical calculator to determine the correlation coefficient.

Trend analysis

The data gathered from the survey was analyzed for trends, especially regarding the answers about politics versus the answers about vaccine hesitancy. To analyze the data further, I employed thematic coding techniques that were again used to identify recurring trends, this time through qualitative methods. The number of instances in which those themes were recorded and converted into a percentage in regard to the entire sample. This allowed for an in-depth exploration of public sentiment and provided insight into the driving factors behind vaccine hesitancy. By integrating these two methods, I aimed to establish a cause-effect relationship between political ideology and vaccine skepticism. The trend analysis was supported by external literature on political polarization and its impact on scientific trust. Research indicates that divides have intensified public distrust in health policies, especially regarding COVID-19 [11]. My findings add to and agree with these conclusions, as qualitative responses frequently cited political rhetoric as a factor influencing vaccine decisions.

Findings

After conducting my statistical tests, I revealed a slight to moderate correlation between politicization and vaccine hesitancy. My correlational analysis, with values based on category-grouped responses, revealed a correlation coefficient (r) value of 0.462, showing that there is a moderate positive relationship between political beliefs and vaccine hesitancy—individuals with stronger political inclinations, whether partisan or ideological, tended to exhibit more pronounced vaccine hesitancy. This is important in filling a gap in the existing body of knowledge as it establishes a relationship between vaccine hesitancy and political campaigns that previously had not been noted. While this does not establish direct causation, it supports the hypothesis that political affiliation and exposure to political discourse significantly influence an individual's decision-making process regarding vaccination. The following graphs were created using the Pearson Statistical Calculator to visualize the trends between my variables (Figure 2).

My trend analysis also showed that those whose decision to get vaccinated was influenced by policies or political action were more likely to support the notion that the political field and medical field should be intertwined. Furthermore, trends also showed that those under the age of 35 generally believed that the biggest factor that should affect one's decision to get vaccinated should be personal preference, while those above the age of 35 generally believed that the advice of a doctor or other medical professionals should be the biggest factor in that decision. However, a clear causation between vaccine hesitancy and political campaigns could not be established from the trend analysis as there was an insignificant amount of data given in my responses to support the belief that vaccine hesitancy could be caused by political campaigns.

Discussion

The results of my statistical tests align with prior studies that indicate the increasing politicization of healthcare decisions and highlight how political narratives can directly affect personal medical choices. A particularly noticeable trend in my findings was the age-related divergence in attitudes toward vaccination. This divide may be due to shifting cultural attitudes, increasing distrust in institutions among younger populations, and the prevalence of social media as a primary source of information. Younger generations who have grown up in an era of political polarization and digital misinformation may be more susceptible

	Yes	Neutral	No
0-20			
20-40			
40-60			
60-75			

Figure 1 Data organization chart template.

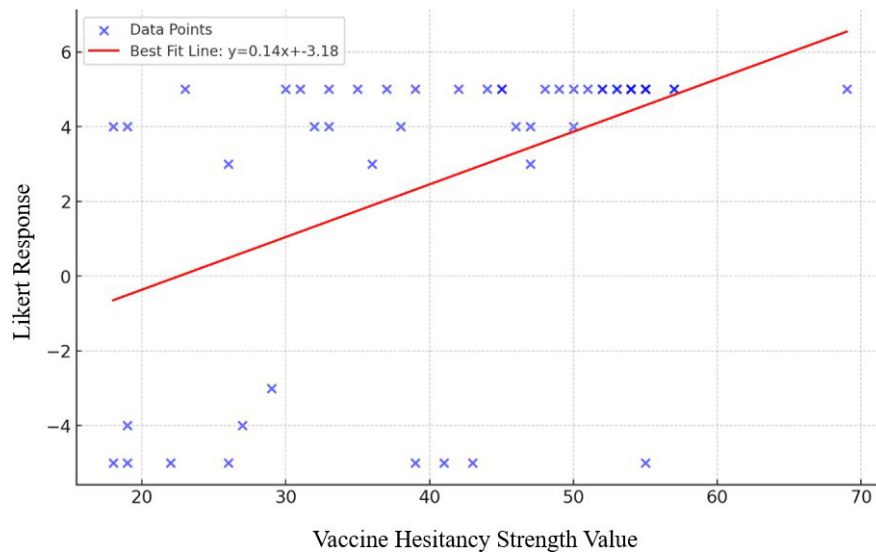


Figure 2 Relationship between vaccine hesitancy and political campaigns.

to narratives that emphasize personal freedom and happiness over collective responsibility. Meanwhile, older generations, who have historically experienced major public health campaigns and have been exposed to more traditional sources of medical advice, place greater trust in health experts. Furthermore, the difference in vaccine hesitancy among age groups could reflect broader societal trends, including generational shifts in attitudes toward authority and expertise. As trust in traditional institutions declines among younger individuals, they may turn to alternative sources of information, such as social media influencers and community-based opinions. This reliance on non-traditional sources can sometimes lead to an increased risk of exposure to misinformation, particularly when political agendas intersect with public health messaging. The rise of individualistic ideologies, as shown in modern political discourse, may further encourage younger populations to prioritize personal autonomy over collective well-being.

Implications for public health policy

My findings also have broad implications for public health policy and vaccine advocacy efforts. Given the relationship between political campaigns and vaccine hesitancy, it is important to understand that vaccines cannot be viewed simply as medical initiatives but must also address the political and ideological factors that shape public perception. It is also important to consider the role of community-based ideologies in combating vaccine hesitancy. My findings indicate that trust in political and medical institutions significantly influences vaccination decisions, suggesting that localized and community-led health initiatives could be more effective than broad and global or nationally based policies. Empirics have shown that when trusted local figures—such as religious leaders, teachers, or community organizers—endorse vaccines, policies to community engagement, vaccine hesitancy may improve, particularly in populations that distrust centralized authority. For instance, framing vaccination as a means of protecting personal freedoms could resonate more with individuals who are skeptical of government intervention in healthcare.

The global impact of politicized vaccine hesitancy

The implications of my findings can be attributed beyond the context of COVID-19 and the United States. The politicization of healthcare is not unique to one country, as similar trends have been observed globally, particularly in nations where ideological divides play a major role in shaping public opinion. For instance, in countries such as Brazil and France, political narratives have influenced vaccine uptake [24]. One of the most alarming potential consequences of vaccine hesitancy is the resurgence of preventable diseases. Once-extinct diseases such as measles, polio, and whooping cough have made a comeback in some regions due to declining vaccination rates. If political polarization continues to erode trust in vaccines, we may see a reversal of decades of public health progress [25].

This could be particularly devastating in lower-income nations, where vaccine hesitancy combined with limited healthcare access could result in widespread outbreaks, putting the world at risk. Moreover, the global rise in vaccine skepticism has broader implications for international public health cooperation. Countries that experience high rates of vaccine hesitancy may struggle to meet global immunization targets, which could impact efforts to combat emerging infectious diseases.

The role of social media and misinformation

Another key factor that emerged in my research is the influence of media consumption on vaccine attitudes. While my study focused primarily on political influences, it is important to recognize that misinformation can also play a crucial role in vaccine hesitancy. In fact, many of the respondents to my survey noted that social media was one of their primary sources of information regarding politics. This becomes an issue since social media platforms have amplified the spread of misleading information about vaccines, allowing false narratives to gain traction [26]. This is particularly concerning given that younger populations, who exhibited higher rates of vaccine hesitancy in my study, are also more likely to rely on social media for news. The connection

between misinformation and vaccine hesitancy suggests that efforts to combat hesitancy should be tied to media literacy initiatives. Schools, universities, and public health organizations should prioritize education on how to critically evaluate information sources and recognize misleading narratives, which could solve this issue [27]. Additionally, technology companies and policymakers must play a more active role in regulating misinformation on social media platforms. Algorithms that promote exaggerated and attention-seeking content over factual reporting have contributed to the spread of vaccine hesitancy, making it essential to implement more effective mechanisms and transparency in content moderation [28,29].

Conclusion

The intersection of politics and healthcare is a defining factor in public health decisions. This study has shown that vaccine hesitancy is a reflection of deeper societal shifts, including generational distrust, political identity, and the growing influence of digital media. Understanding these underlying forces is crucial in order to move beyond short-term interventions and create sustainable solutions for public health. An important takeaway from this research should be that vaccine advocacy cannot be approached with a one-size-fits-all strategy. While older generations may respond well to traditional public health messaging from medical professionals, younger populations who are more skeptical of modern-day medicine may require different strategies. This means that combating vaccine hesitancy is not just a medical challenge but a cultural and social one. Additionally, this study highlights the exigence of depoliticizing public health. When vaccines become symbols of political identity rather than medical technology, public trust erodes, and health outcomes suffer. Given the findings of my study, long-term solutions to vaccine hesitancy should focus on rebuilding public trust in both political and medical institutions. Transparency is crucial for governments and health organizations, as well as open communication, acknowledging uncertainties, and addressing public concerns rather than dismissing skepticism and silencing voices.

Long-term strategies

Given the findings of this study, long-term solutions to vaccine hesitancy must focus on rebuilding public trust in both political and medical institutions. Transparency is key as both governments and health organizations should strive for open communication, acknowledging uncertainties and addressing public concerns rather than dismissing skepticism and silencing voices. Additionally, promoting bipartisan support for vaccines will be essential in preventing further polarization.

Limitations

Limitations in my work arise within the methodology. Due to time restraints and nonresponse bias, I was only able to get 65 participants, which makes the statistical significance of my results more difficult to prove or apply. Sample size is preferred to be at least 100 participants for clear statistical significance, meaning my sample size of 65, which, although close to 100, might face some challenges (Gallo, 2016). A larger participant pool could have strengthened the reliability of my findings and provided

a more concrete conclusion. Additionally, my data gathering method of conducting a survey also limited the amount and quality of information I could gather from participants, which could have affected the results of my trend analysis. While my survey provided a broad overview of trends, it did not capture the depth of individual reasoning behind vaccine decisions that other research methods might be able to. Furthermore, the steps I utilized to determine a relationship between my two variables are quite basic and could raise issues when applying my work to large populations. A more sophisticated approach, such as longitudinal studies, could have provided a clearer understanding of the strength and direction of these relationships. Causation was also a difficulty in my work as although causation seemed apparent, the main portion of my findings and analysis could not be attributed to causation as a relationship between two variables does not indicate that one causes the other. Being unable to establish causation hinders the strength of the implications of this study since a rise in vaccine hesitancy cannot be directly attributed to political campaigns. This highlights the need for further research using more rigorous methods to confirm or challenge the interpretations presented in this study. Future studies could incorporate experimental or longitudinal designs to better assess causal relationships over time.

Future directions

I suggest that future research should continue to explore the complex interplay between politics and health decision-making. While my study provides valuable insights into the relationship between politicization and vaccine hesitancy, further investigation is needed to determine the most effective interventions for different demographic groups. Deeper exploration of potential confounding factors could be made to determine whether or not the relationship established in this study between political campaigns and vaccine hesitancy was influenced by any lurking variables. Although some confounding variables were accounted for in my study, many were not regarded, potentially skewing my results. In addition, future research could aim to conduct a scientific experiment on the relationship between political campaigns and vaccine hesitancy my research has established in order to further and more accurately evaluate the strength of causation behind these two variables. Due to a lack of causation established by my study, future research could attempt to fill that gap, allowing the field of inquiry to have complete understanding of political campaigns in relation to vaccine hesitancy. By expanding on these findings, a future where vaccines are viewed not as political statements but as essential tools for public health and safety is possible.

References

1. Ofri D (2024) The Reasons for Covid Vaccine Hesitancy. The New York Times.
2. World Health Organization (2015) Vaccine hesitancy: A growing challenge for immunization programmes. World Health Organization: Geneva, Switzerland.
3. Swanepoel A, Abed R, Kaser M, Smith PSJ (2023) How evolutionary science can help us understand vaccine refusal in the COVID-19 pandemic. *BJPsych bulletin* 47: 224-228.

4. Goldman M (2024) Most Americans don't plan to get another COVID shot. *Axios*.
5. Larson HJ, Morrison JS, Bliss KE (2021) A Crisis Decades in the Making: Vaccine hesitancy from smallpox to covid-19. *Why Vaccine Confidence Matters to National Security*, Center for Strategic and International Studies (CSIS): 6-11.
6. Esparza J (2024). Introduction of the smallpox vaccine in Napoleonic France, as recorded in contemporary medals. *Vaccine* 42: 3578-3584.
7. Morgan AJ, Parker S (2007) Translational mini-review series on vaccines: The Edward Jenner Museum and the history of vaccination. *Clin Exp Immunol* 147: 389-394.
8. McCarthy E (2020) The Regulatory Production of Vaccine Hesitancy. *Brook L Rev*: 86.
9. Zhou L, Ampon-Wireko S, Xu X, Quansah PE, Larnyo E (2022) Media attention and Vaccine Hesitancy: Examining the mediating effects of Fear of COVID-19 and the moderating role of Trust in leadership. *Plos one* 17: e0263610.
10. Munro A (2024) Populism *Enc Brit*.
11. Kennedy J (2019) Populist politics and vaccine hesitancy in Western Europe: An analysis of national-level data. *Eur J Public Healt* 29: 512-516.
12. Mills C The deadliest virus: EBSCOhost (2024). *Ebscohost.com*.
13. Wilson SM (1994) On the matter of smallpox. *Nat History* 103: 64-68.
14. Funk C, Kennedy B, Pasquini G (2023) What Americans think about COVID-19 vaccines? *Pew Research Center*.
15. Goje O, Kapoor A (2024) Meeting the challenge of vaccine hesitancy. *Cleve Clin J Med* 91: S50-S56.
16. Rothstein A (2015) Vaccines and their critics, then and now. *The New Atlantis*: 3-27.
17. Attwell KC, Navin MARK (2019) Childhood vaccination mandates: Scope, sanctions, severity, selectivity and salience. *Milbank Q* 97: 978-1014.
18. Long CS (2019). The effect of science education classes on preservice elementary teachers' attitudes about science. *"J Coll Sci Teach* 48: 77-83.
19. Jaime A (2025) False Measles Vaccine Conspiracy Theories Won't Stop: Here's Everything You Need to Know. *Teen Vogue*.
20. Link-Gelles R (2022) Public health response to a case of paralytic poliomyelitis in an unvaccinated person and detection of poliovirus in wastewater—New York, June–August 2022. *MMWR. Morbidity and mortality weekly report* 71.
21. Hartig H, Daniller A, Keeter S, Van Green T (2023) Voter Turnout, 2018-2022. *Pew Resarch Center*.
22. Choi BC, Pak AW (2004) A catalog of biases in questionnaires. *Prev Chronic Dis* 2A13.
23. Boateng GO Neilands TB, Frongillo EA, Melgar-Quinonez HR, Young SL, et al. (2018) Best practices for developing and validating scales for health, social, and behavioral research: A primer. *Front public health* 149.
24. Seara-Morais GJ, Avelino-Silva TJ, Couto M, Avelino-Silva VI (2023) The pervasive association between political ideology and COVID-19 vaccine uptake in Brazil: An ecologic study. *BMC Public Health* 23: 1606.
25. Schnirring, Lisa (2024) *Umn.edu*.
26. Allen S (2023) How Social Media Rewards Misinformation. *Yale Insights*.
27. Pappas S (2022) Fighting fake news in the classroom. *Monitor psych* 53: 50-58.
28. GPEI-Timely outbreak response, enhanced surveillance halts wild poliovirus transmission in Southern Africa. (2024). *Polioeradication.org*.
29. Falkenbach M, Willison C (2022) Resources or trust: What matters more in the vaccination strategies of high-income liberal democracies?. *Health Policy Technol* 11100618.