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RESEARCH ARTICLE

Feminist identity is associated with positive COVID-19 vaccine behaviors and beliefs

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In this article, we consider the potential associations between feminist identity and willingness to adopt vaccine-related COVID-19 mitigation efforts. Recognizing that individuals' pandemic experiences were highly gendered and that the costs of the pandemic were distributed asymmetrically between men and women, we theorize that individuals espousing a commitment to feminist ideals were more likely to adopt behaviors intended to mitigate disease risk during the pandemic. We empirically validate our hypotheses by analyzing data from a large, nationally representative multi-wave survey of US respondents deployed in early 2022. The results of these analyses suggest that feminist identity is associated with beliefs and behaviors relating to a range of COVID-19 vaccination mitigation efforts. Notably, this relationship holds for both women and men, highlighting the role of identity independent of sex. Thus, identity-based public health policies might be one means to overcome public skepticism during future pandemics.

Keywords COVID-19 • pandemic • feminism • identity • equality • public opinion

Key messages

- Feminist identity is associated with beliefs and behaviors relating to the COVID-19 vaccination.
- Gender alone fails to explain vaccine behaviors, intentions, and policy preferences.
- Feminism correlates with pro-vaccine behavior even for those concerned about vaccine safety.
- Identity-based public health policies may help overcome public skepticism during future pandemics.

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Introduction

The COVID-19 pandemic represented the most significant global public health challenge in over a century. Its human costs were both extensive and truly global, ultimately resulting in millions of deaths as the novel pathogen responsible for the disease eventually spread to virtually every country. Beyond the immediate health burdens associated with the disease itself, governments' efforts to contain its spread often had profound economic, social, and political consequences. Across the globe, government-imposed lockdowns and other restrictions on social and economic interactions reduced national wealth and increased poverty rates (see, for example, World Bank, 2022), exacerbated political cleavages (see, for example, Gadarian et al, 2022), spurred social unrest (see, for example, Wood et al, 2022), and contributed to the deterioration of mental health and community well-being (see, for example, Vindegaard and Benros, 2020).

Despite its global scale and widespread social and economic impact, the costs of the pandemic were unevenly distributed across groups within societies. In particular, historically marginalized groups bore an unequal share of the health burden of the disease itself and were disproportionately impacted by government-imposed pandemic mitigation efforts, such as travel bans, suspension of public transit services, and school and business closures. While specific patterns of vulnerability varied cross-nationally, the asymmetrical distribution of risks and harms resulting from the pandemic is well documented.[1] Notably, women represent the numerically largest of these identity groups. In most contemporary societies, embedded gender hierarchies continuously reinforce male authority and contribute to the overrepresentation of women in lower-paid, less-prestigious "frontline," "key worker," and domestic caring roles. As a consequence of this deeply gendered distribution of labor, the pandemic posed an acute threat to the social status, financial well-being, mental health, and physical security of women (Burki, 2020; Madgavkar et al, 2020; Zamarro et al, 2020). Reflecting the gender biases inherent in their societies, few governments considered the gendered implications of COVID-19 mitigation policies (see Greer et al, 2021; Piscopo and Och, 2021; Waylen, 2021), and fewer still adopted strategies explicitly designed to ameliorate the unequal burden that the disease and the chosen mitigation policies imposed on women.[2]

While governments largely overlooked (or ignored) the gender-specific consequences of the pandemic, they were widely discussed in the Western media (Donner, 2020; McDonald, 2021; The Economist, 2021). Indeed, some journalists, scholars, and activists called for a "feminist response" to the crisis, asking individuals committed to the principles of gender equality and gender egalitarianism to collaborate and to coordinate their responses to COVID-19 (see Abirafeh, 2020; Izadora and Hinz, 2020). For example, at the outset of the pandemic, *Atlantic* columnist Helen Lewis (2020) perceptively observed that government-imposed "stay-at-home" rules and school closures would undermine the carefully calibrated domestic division of labor within many US homes, producing new bargains over childcare and domestic duties that would almost certainly disadvantage women. While she—and the researchers she interviewed—highlighted the need for gendered approaches to pandemic mitigation, they also (correctly) predicted that most governments would fail to address the gender disparities created by the pandemic. Seeing the need for feminist and gender-sensitive approaches in pandemic response policies, the Hawai'i State Commission on the

Status of Women (2020), as well as similar organizations, developed feminist-driven ideas for COVID-19 recovery policies. These policy recommendations attempt to correct the pre-existing gender inequalities that resulted in the unequal impact of the pandemic on women and other marginalized communities (McClain and Cahn, 2020; Piscopo, 2021). Overall, these calls for a feminist response to the pandemic suggest that feminism might be an important factor in explaining people's willingness to adopt costly behaviors that would mitigate the impact of COVID-19.

In this article, we consider this proposition and endeavor to examine it empirically. As we argue later, it is not necessarily women or those who express concern about the gender disparities who were likely to act in a manner to mitigate the impact of COVID-19. Instead, we contend that the collective action needed to reduce gender inequalities is more likely to be associated with people who identify with the feminist movement. Feminists are fundamentally motivated by concerns about societal gender inequality and were therefore likely the most attuned to the gender disparities of the pandemic. Given that feminists' beliefs about the importance of combating gender inequality are deeply integrated into their conceptions of self and represent a cornerstone of their identity (Williams and Wittig, 1997; Nelson et al, 2008; Liss and Erchull, 2010), we argue that individuals that more strongly identify as feminists should have been more highly motivated to adopt behaviors and embrace policies that they believed would directly or indirectly reduce the unequal burdens the pandemic had imposed on women.

In developing this argument, we build upon previous research that identifies social identity as an important motivator for participation in collective action (for example, Liss et al, 2001; Van Zomeren et al, 2008). In particular, we draw insights from the social identity model of collective action (SIMCA) (Van Zomeren et al, 2008), which contends that individuals who strongly identify with a specific social group are more likely to undertake actions to protect the group and achieve group goals. COVID-19 mitigation decisions and vaccination have implications not only for individual health but also for the health and well-being of broader communities. However, individuals may be tempted to freeride and reap the benefits of the actions taken by others while refraining from engaging in potentially costly actions themselves. Therefore, reducing the spread of infectious diseases and obtaining herd immunity require overcoming collective action problems (Ozdemir et al, 2011; Sandler, 2020). Vaccination was often touted by governments and health authorities as the pinnacle of communal action, which would help rapidly end the pandemic and allow citizens to resume pre-COVID-19 "normal life." By hastening the end of the pandemic, vaccination could indirectly play an important role in reducing the additional gender-based inequalities it had imposed upon women in most societies. Given the collective underpinnings of feminism, and assuming that feminists should be particularly attuned to the gendered consequences of the pandemic, we expect that self-identified feminists were comparatively more likely to take potentially costly action and vaccinate themselves and their children, more likely to support policies mandating vaccination, and more likely to express disapproval of anti-vaccine activists and their activities.

We test this argument by analyzing data from a nationally representative survey deployed during the COVID-19 pandemic (January–February 2022) in the US. The results suggest that feminist identity is positively associated with higher rates of COVID-19 vaccine uptake and future pro-vaccine behavioral intentions and

negatively associated with support for anti-vaccine activism. These associations persist even after controlling for partisanship, ideology, trust in health and government officials, and other demographic characteristics. These results are consistent with SIMCA, highlighting the importance of social identities as a motivating factor for engaging in collective action (Van Zomeren et al, 2008).

Understanding that social identities like feminism have the capacity to influence individuals to engage in action during crisis yields implications for public policy. We suspect that compliance with public health recommendations may be more probable when public health campaigns actively target movement-related social identities, as such identities are closely linked with collectivist tendencies. This presents a significant challenge to public health officials because simply raising concerns about the inequalities may prove insufficient for obtaining mass compliance with pandemic mitigation efforts among those who fail to internalize a movement-related identity. Policymakers might also find success in discussing the disparate outcomes beyond the immediate health consequences, detailing the social and economic costs that arise when a disease goes unmitigated. Strategies that connect specific outcomes (health, economic, and social) to a specific identity group are costly but potentially have a greater payoff than general public health messaging.

The gendered impact of the COVID-19 pandemic

The disproportionate impact of the pandemic on women is observed across multiple contexts, including inequalities in health-related outcomes (for example, "long COVID" rates and related longer-term disabilities) and more subtle changes in women's social roles, household responsibilities, and financial earnings (Connor et al, 2020). While data from early in the pandemic suggested that men were more likely to die of COVID-19 infection, the overrepresentation of women in public-facing occupations—such as the service industry and teaching and caring roles—significantly increased their risk of exposure to the disease (Connor et al, 2020; Morgan et al, 2022). As women make up 70 percent of the healthcare workforce globally (Boniol et al, 2019) and nearly 80 percent in the US (Connor et al, 2020), they were overrepresented on the frontlines caring for infectious patients during COVID-19. Similarly, daycare workers and others working in the social care industry (overwhelming women) were found to be at higher risk for COVID-19 (Bonde et al, 2023).[3] The high levels of exposure to COVID-19 that result from working in these roles may partially explain the high prevalence of "long COVID" among women (Torjesen, 2021). Thus, greater exposure to COVID-19 and higher rates of infection not only adversely impacted women's physical health in the short term but also created longer-term gender health disparities because comparatively more women face chronic COVID-19-related health conditions that diminish their quality of life.

Women's position within the broader labor market also made them more vulnerable to adverse consequences of the pandemic. Women, particularly minority women (Holder et al, 2021), are overrepresented in lower-wage, lower-prestige occupations, which are often among the first jobs cut during periods of economic downturn. As a result, women were more likely to be laid off, experience periods of unemployment, or experience reductions in wages or work hours during the pandemic (Zamarro et al, 2020; Kabeer et al, 2021). In addition to involuntary layoffs, the necessity of caring for children following the mass closure of schools in many areas—coupled with the

gendered social expectations of caregiving imposed on women in most societies—resulted in large numbers of women temporarily leaving the workforce (Gezici and Ozay, 2020; Mooi-Reci and Risman, 2021; Reichelt et al, 2021). Women were also more likely than men to drop out of school during the pandemic (Fisseha et al, 2021), which has knock-on effects on women's future employment and earning potential. Consequently, an estimated 47 million women worldwide will experience poverty as a direct consequence of the pandemic (Costopulos and Lal, 2020), and millions more will experience economic deprivation or fail to achieve their economic potential as an indirect result of the pandemic.

Due to their position on the frontlines, from which they observed the most devastating effects of COVID-19 on a daily basis, women carried a high pandemic-related mental health burden (Thibaut and van Wijngaarden-Cremers, 2020). Women's mental health suffered as schools were closed and childcare responsibilities sharply increased (Cheng et al, 2021; Croda and Grossbard, 2021; Wade et al, 2021). Women's share of household duties also drastically increased during the pandemic. Johnston et al (2020) indicate that during COVID-19, women spent more than double the amount of time on childcare responsibilities than men. The dramatic (and asymmetrical) global increase in unpaid labor exacerbated the adverse mental health effect of COVID-19 on (primarily) female caregivers, contributing to higher rates of depression and anxiety (Seedat and Rondon, 2021). Quarantines also forced many women into unsafe housing situations and eliminated their safety networks, resulting in an increase in gender-based violence (Mittal and Singh, 2020; Usta et al, 2021) and intimate partner violence (Valera et al, 2022). The cumulative effect is that women ultimately faced substantial and often untreated mental health issues resulting from their pandemic experiences (Almeida et al, 2020; Wade et al, 2021).

Based on this overview, we might expect women as a group to be more proactive in mitigating the virus out of self-interest or preservation. However, self-interest is inconsistently connected to the broader belief systems and behaviors of the mass public (Sears et al, 1980; Feldman, 1982; Krimmel and Radar, 2017). This is affirmed by studies that suggest that, on average, women were no more likely than men to engage in pro-mitigation behaviors (Myerson et al, 2021; Gadarian et al, 2022; Ramirez and Wood, 2024). While some studies show that women were more concerned about COVID-19 (Lewis and Duch, 2021; Ferrín, 2022) and women leaders were more proactive in taking steps to mitigate the virus (Piscopo and Och, 2021; Tyner and Jalalzai, 2022), there is little evidence that women were more likely to be vaccinated than men (Gerretsen et al, 2021; Walcherberger et al, 2022; Zintel et al, 2023).[4]

Similarly, we might anticipate that those individuals most concerned about gender inequality would be more likely to act in a manner to alleviate COVID-19-related gender disparities. Yet, broad and abstract attitudes routinely fail to predict observed behaviors across a variety of contexts (see Wicker, 1969; Eagly and Chaiken, 1993; Bechler et al, 2021). A large majority of Americans are willing to express concern about gender inequalities in the abstract (Elder et al, 2021). For some, such responses likely reflect broad social norms rather than genuine commitments. Indeed, the fact that many Americans opposed behaviors to mitigate the spread of the virus despite widespread support for gender equality would suggest the high levels of abstract support for gender equality might not translate into actionable behaviors.

We alternatively suggest that the gendered disparities caused by COVID-19 were most likely to trigger a behavioral reaction from people who have internalized a

desire for gender equality into their self-image. Social identity scholars have shown that the process of integrating a belief system into an identity often generates a strong motivation to act on behalf of the identity group (Van Zomeren et al, 2008). Acting on behalf of the identity triggers positive rewards and self-esteem for both the individual and the group. Thus, we suspect feminist identification provides a robust link to pro-vaccine behaviors or behavioral intentions to vaccinate, as self-identified feminists should not only be concerned with reducing gender inequalities but also have made acting on behalf of women a fundamental aspect of their public life. Feminists, regardless of gender, should support actions that reduce gender inequalities because the goal of reducing gender inequalities is the goal or main belief guiding the feminist movement. Women and men who identify as feminists share this goal and a greater inclination to support and act in a collective manner to improve the lives of women (Scarborough, 2018). Since the pandemic is responsible for increasing gendered inequalities, feminists should be likely to engage in behaviors that mitigate the virus and, subsequently, its adverse effects on women as a means to alleviate the pandemic's gendered impact.

A handful of previous studies have highlighted the role that masculinity played in discouraging compliance with COVID-19 mitigation behaviors (see, for example, Cassino and Besen-Cassino, 2020). Reny (2020) further demonstrates that more sexist individuals were less concerned about COVID-19 and less likely to comply with pandemic mitigation policies. We further this discussion by moving away from beliefs about gendered roles and focusing more explicitly on how identification with the feminist movement might have led people to adopt behaviors to mitigate the virus. Moreover, we broaden the scope of the outcomes analyzed by examining how feminist identity influences attitudes toward pandemic mitigation policies, behavioral intentions to vaccinate, and sentiments about anti-vaccine protests.

Feminist social identity

Humans naturally organize themselves into groups. Consequently, social identities are a core component of society and help us understand political behavior and social interaction. A social identity is a person's self-concept or sense of who they are based on their attachment to a social group. Social identity theory posits that people will form an identification with a social group when they (1) view society through a lens of contrasting groups (that is, social categorization) and (2) attach distinct values to membership in different groups (that is, social comparison) (Tajfel, 1981; 1982). Identification with a group then serves as a mechanism to enhance a person's self-esteem typically through in-group benefits and the exclusion of out-group members. Those who hold a given social identity often have a willingness to publicly identify with the group in order to reap the psychological benefits of identification. Thus, the benefits of holding a social identity sometimes manifest through participation in collective endeavors that favor the in-group (Williams and Wittig, 1997; Klandermans et al, 2002). This process of social categorization and comparison occurs for all kinds of groups with political relevance (for example, race, religion, nationality, socioeconomic status, and geographic location), including among people who support equal rights for women and internalize that support into a feminist social identity.

Feminist identity, which we define as self-identification with the feminist movement, represents a social identity particularly relevant to the COVID-19 pandemic. More

specifically, this identification consists of having a positive affective feeling toward the feminist movement, a belief in the movement's ideals, and a sense of belonging to the group.[5] Identification with the feminist movement leads individuals to feel connected and integral to the movement, where a person gains psychological benefits from the group's successes (McGarty et al, 2009). Consequently, identification with a group has a strong social dimension, where people feel connected to other group members or a sense of collective belonging. Working together leads to psychological benefits for those who identify with the group and potential externalities as well.

This sense of collective belonging is central to our definition of feminist identity.[6] Collective belonging has been identified as a key mechanism that leads people to mobilize, participate, and advocate on behalf of the group (Polletta and Jasper, 2001). Those who adopt a feminist identity choose to align themselves with the broader feminist movement largely because they believe that individual and group actions are important means of achieving positive social change for women. Downing and Roush (1985) suggest that feminist identity develops as a person recognizes gender inequality, attributes this inequality to an unjust system, and gains a desire to change the status quo through collective behavior. Similarly, Williams and Wittig (1997) argue that belief in collective action is not simply a byproduct of feminist identity but a prerequisite to identification as a feminist, as both derive from a sense of group injustice and efficacy. The adoption of a feminist identity, then, translates into a greater willingness to engage in collective action to advance the goals of the group and to address any concerns or grievances relevant to the group (Nelson et al, 2008).

Numerous studies confirm that identifying as a feminist can be associated with an increase in various forms of collective beliefs or behavior (Crosby et al, 1996; Liss et al, 2001; 2004; Nelson et al, 2008). Liss and Erchull (2010) find that individuals who strongly self-identify as feminists are more likely to believe that collective action is necessary to promote the goals of the movement. Myaskovsky and Wittig (1997) find that belief in collective action, measured by one's willingness to engage in change via unification, is a factor that can significantly improve the prediction of who identifies as a feminist socially. Liss et al (2004) find that feminism is tied to a greater desire to act on behalf of women. Similarly, Buschman and Lenart (1996) find that college women who identify more strongly as feminists are most likely to hold collectivist views as opposed to individualistic orientations.

Notably, identification with a social group does not require objective group membership, that is, membership based on a set of clear rules or features (Huddy, 2013). Rather, people can self-identify with a group even if they do not meet normative criteria for group inclusion. For example, people can identify with members of the opposite sex or members of a racial group to whom one does not objectively belong. The implication is that women and men can identify with the feminist movement. In addition, objective group membership does not automatically equate with identification with the group. Women are not inherently feminist unless they consciously choose to identify themselves as such based on their shared beliefs in the principles and goals of feminism (Conover, 1988; McGarty et al, 2009). Indeed, many women support traditional roles and patriarchal social structures (Andre et al, 2013). Conover (1988) describes how it is feminist identification that firmly establishes the "fundamental values" to reduce gender inequalities among women. Without identification as a feminist, women sometimes behave in support of patriarchal structures.

Feminist identity and COVID-19 mitigation

According to the SIMCA model, possessing a strong social identity promotes collective action by bridging two previous explanations of collective action: injustice and efficacy. Individuals with strong social identities readily perceive injustices and feel a sense of agency to combat those injustices on behalf of their group (Van Zomeren et al, 2008). As a result, they choose to engage in action on behalf of their group. Thus, some of the same forces that contribute to the development of a social identity also contribute to collective action. This is key because it means that feminists possess not only a concern about gender equality but also a desire to act on behalf of achieving this goal.

This willingness of feminists to act on behalf of the group should have been made salient by the COVID-19 pandemic. COVID-19 was an incidental injustice for women, as the injury women faced was the result of the pandemic. Vaccinating could directly and indirectly ameliorate the gendered effects of the pandemic, as vaccination was expected to reduce the risk of COVID-19 transmission and illness. Given that women were at greater risk for COVID-19 exposure due to their disproportionate representation in customer-facing service roles, education, and health and care roles, increasing vaccination rates among the population (including children) would reduce the rate of infection among women. Vaccinating (both themselves and their families) would represent one strategy available to an individual seeking to protect women in these and other roles. Moreover, since the goal of vaccination was to reduce the spread of the virus and ultimately end the pandemic, vaccination would also help end other gendered effects of the pandemic.

Feminists were visibly attuned to these gendered impacts. Following the footsteps of the Hawai'i State Commission on the Status of Women (2020), feminist-minded organizations developed and adopted pandemic adaptation and recovery plans that put feminist ideas front and center. Recognizing that patriarchal, colonial, and hierarchical social structures prior to the pandemic were responsible for the gendered impact of COVID-19, feminist-minded organizations advocated for COVID-19 recovery plans that dismantled such systems and were considerate of the needs of various marginalized groups (McClain and Cahn, 2020; Piscopo, 2021; Zubek and Hinz, 2020). Thus, they advocated doing more than simply creating policies that mitigated COVID-19 by also removing social, political, and economic barriers that contributed to the inequalities exacerbated by the pandemic (Cook and Stab, 2022; Orser, 2022). Although such recommendations went beyond stemming the virus, this movement provides a clear example of how feminist-minded groups were situating the pandemic into the feminist movement and their concern about the pandemic's gendered impacts.

The inherent collectivist nature of feminist identity should have also made feminists more willing to act in a manner to mitigate the gendered impacts of the pandemic through actions like vaccination. This expectation also aligns with literature indicating that feminists tend to strongly favor efforts to promote social justice more generally (Kelly and Gauchat, 2016). In contrast, non-feminists were likely less aware of these issues (and cared less strongly about them) and were thus less likely to view vaccines as a behavior that would address gender disparities created by the pandemic.

Abiding by recommended COVID-19 mitigation protocols typically required the participating individual to absorb some level of cost, for example: staying home required forgoing valuable social interactions; wearing a mask in public places was

inconvenient and bothersome to many people; and receiving a newly developed vaccine entailed a risk of serious side effects. Owing to these costs, many people declined to adopt COVID-19 mitigation strategies, particularly when they were recommended rather than required, where rules were weakly enforced, or where penalties for violating rules were minimal. However, individuals possessing strong prosocial identities like feminism should have been more willing to accept these costs if they believed that a given behavior would benefit their group or its interests. Previous studies have demonstrated that vaccination is an altruistic and prosocial act associated with a desire to help others (Murphy et al, 2021; Enea et al, 2023). Combining this general observation about the relationship between prosocial attitudes and vaccines with our knowledge of feminist identity, we assert that individuals who strongly identified as feminists were more likely to believe that COVID-19 mitigation efforts like vaccination would help ameliorate the costs of the pandemic for women and should have been comparatively more likely to adopt these behaviors.

From this argument, we derive a set of testable hypotheses. First, we expect people who more strongly identify as feminists to be more likely to receive a COVID-19 vaccine (H1) and state their intention to receive a vaccine booster (H2). Further, we anticipate that feminist identifiers will be more willing to vaccinate their children in order to mitigate the effects of the pandemic on women, who often hold the primary childcare responsibilities and work in the teaching profession (H3). Feminists should also report greater support for vaccine mandates, which exist to support the increase of vaccination across the population and that, if enforced, should lessen the pandemic's impacts on women (H4). Given the preponderance of anti-vaccination protests during the pandemic, we also expect that feminism would orientate identifiers to oppose such counter-movements, as protests aim to move society away from vaccination and other mitigation behaviors, which would prolong the pandemic and pandemic-related gender inequalities (H5).

Finally, we note that there have been attempts by conservative, alt-right, and other patriarchal-leaning groups to garner support for anti-vaccine policies and movements via feminist messaging (Schreiber, 2008; Cowden and Yuval-Davis, 2022; Brady et al, 2023). These groups use phrases like "my body, my choice" and "believe women" to promote anti-vaccine arguments. Despite the many different conceptualizations of feminism (Delmar, 2018), such misinformation is often viewed by feminists as counterproductive to feminist goals and outsider attempts to hijack the movement by women who support patriarchal gender roles (Conis, 2013; Cafiero et al, 2021). Consequently, we do not believe that feminists will be more supportive of anti-vaccine behaviors, though this is an empirical question that we test in the following.

Survey data and measurement

We empirically examine the relationship between feminist identity and COVID-19 vaccination beliefs/behaviors using a national survey regarding COVID-19. The survey was administered by YouGov in two waves in early 2022. The first wave was deployed between January 17, 2022, and January 21, 2022, to 2,947 adult (18+) respondents in the US. Wave 2 was deployed between February 7, 2022, and February 16, 2022, to the same set of respondents.[7] The sample is drawn from YouGov's respondent pool and matched on demographic and political variables to the US population using data from the US Census American Community Survey and various commercial surveys. The sample is representative of the

national population based on several standard demographic factors (for example, education, age, gender, and so on) and key political factors (for example, partisanship and turnout). Since Wave 2 of the study contained the measures of feminist identification, we rely on the 2,216 respondents who completed both survey waves (75 percent reinterview rate). Given the observational nature of our data, we do not make causal claims in this research.

Measurement of outcome variables

We explore five outcome variables to measure the different dimensions underlying perceptions toward COVID-19 mitigation efforts. Each of these was recorded in the first study wave. First, we measure respondents' willingness to receive a COVID-19 vaccine with a question asking them if they have already received a vaccine. Evaluating personal vaccination decisions allows us to understand whether respondents were willing to take personal action to protect vulnerable populations. Respondents who had yet to receive a vaccine were asked a follow-up question regarding their intention to receive the vaccine. These questions were combined into a "vaccine status/intention" variable that ranges from 1 (definitely will not get it) to 6 (already received the vaccine).[8] Second, we measure "booster intention" by asking respondents if they would receive an annual COVID-19 booster vaccine if advised by health professionals. This captures future-looking behavioral intentions.

Our third measure, "vaccinate child," asks if they would vaccinate their child if they were a parent.[9] As women are often the primary caregivers of children, both through roles in the home and through the teaching profession, feminists may feel particularly strong about the vaccination of children. Vaccinating children may protect both vulnerable children and the women who surround them. Further, support for vaccinating children may signal support for broader altruistic goals, as well as a strong faith in the science underlying the COVID-19 vaccine. Additionally, vaccinating children may lead to schools reopening sooner, allowing women to return to the workforce and alleviating them of their increased childcare responsibilities.

As the vaccine rolled out in 2021, the country debated and implemented various vaccine-related policies. For instance, some Americans were required to show proof of vaccination for employment, while various subnational governments debated the use of vaccine passports for public events. States and localities also debated whether COVID-19 vaccination would be required for students attending public schools. Understanding support for vaccine mandates provides insight into respondents' opinions toward personal sacrifice and the potential restriction of rights for the sake of the collective good and the protection of the most vulnerable. Respondents were asked to indicate their position on a five-point scale measuring whether they "strongly oppose" to "strongly support" policies that would require a COVID-19 vaccine for employment, public schools, travel, and attending public places, and whether the government should require people to have the vaccine. To examine the latent structure of these beliefs, we performed an exploratory factor analysis (EFA). The EFA yielded a one-factor solution (Eigenvalue = 3.93) with factor loadings ranging from .84 to .92. Our fourth measure averages responses to these five questions to create a single "vaccine mandate" index ($\alpha = .95$).

As national and subnational political authorities adopted these various policies that mandated proof of vaccine, anti-vaccination protests arose around the country.

Opposition to these anti-vaccination protests may indicate an opposition toward individuals who are promoting risk toward vulnerable groups (including women) and the collective good. Further, opposition to these protests may signal negative emotions or fear toward the prolonging of the pandemic and related mitigation efforts that impede women's livelihoods. In order to measure people's beliefs about these protests, respondents were asked to indicate if they agree or disagree with five statements about organized activist groups that seek to discourage people from getting a COVID-19 vaccine. Specifically, they were asked whether they believed that these groups "benefit society," "raise important questions," "hold government accountable," represent a "threat to public health," and "influence public thinking." Respondents rated these statements on a 1 (strongly disagree) to 5 (strongly agree) scale. To examine the latent structure of these beliefs, we performed an EFA. The EFA yielded a one-factor solution (Eigenvalue = 2.86) with the "influence public thinking" question loading poorly on the factor. We therefore remove that item from the analyses. All other factor loadings are above .6. Our fifth measure averages responses to the remaining four items to create a single "anti-vax protest" scale ($\alpha = .86$).

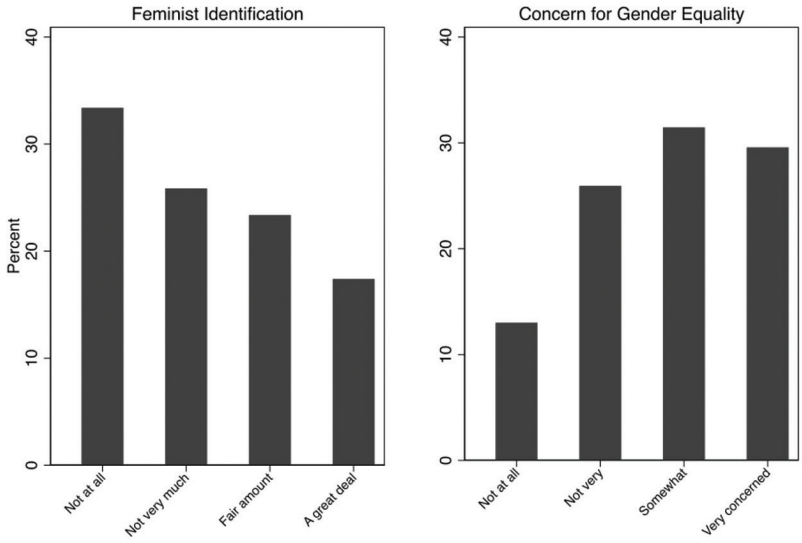
Measurement of independent variables

In its most basic form, feminist identification consists of a person's willingness to self-categorize themselves as a feminist (Downing and Roush, 1985; Moradi et al, 2002). The self-categorization or identification as a feminist derives from perceived injustices toward women and a sense of agency that creates a desire to engage in collective action on behalf of women. Our survey contains a direct measure of feminist identification, albeit such an approach might fall short of capturing more complex definitions of feminist identity (see Delmar, 2018). We measure self-categorization as a feminist by asking respondents, "How much, if at all, do you personally identify as a feminist?" and measuring responses on a four-category scale (see Figure 1). This measure taps into an emotional attachment to the group and a willingness to commit to the feminist movement (Conover and Sapiro, 1993).

As with all surveys, responses are a snapshot from a given moment in time. We assume that feminist identity is largely stable over time and that respondents' strength of identification with feminism would be unchanged during the short interval between the survey waves. The salience of social identities can, of course, shift over time based on shifting circumstances and in response to accumulated experience and environmental stimuli (see, for example, Aronson, 2000). However, feminist identity is generally shown to be durable and highly stable (see, for example, Gerstmann and Kramer, 1997; Huddy, 1997).[10]

The survey also contains a measure of each respondent's concern for gender equality. Although such a concern is an integral part of feminism, affirmation of gender equality extends beyond feminists to non-feminists (Elder et al, 2021). Moreover, concern for gender equality is an abstract belief that lacks the motivational component to act on behalf of one's personal identity group, making it less likely to correlate with pandemic-related behaviors and beliefs. Concern for gender equality is measured by asking respondents, "Generally speaking, how concerned, if at all, are you by the way women are treated in society?" which we also measure on a four-category scale (see Figure 1). Conover and Sapiro (1993) note that such a measure captures a cognitive and normative commitment to gender equality and represents support for the ideals of the

Figure 1: Distribution of feminist identity and gender equality among respondents



feminist movement, though it does not necessarily translate into a desire for collective action on behalf of women that we should observe with feminist identification.

Figure 1 shows the distribution of responses to both the "feminist identification" question and the "concern over gender equality" question.[11] Around 40 percent of our respondents identify as a feminist, which matches other studies done in recent years (Kelly and Gauchat, 2016; Elder et al, 2021). Moreover, we find that significantly more respondents express a concern about gender equality than identify as a feminist.

Control variables

We control for various political and personal characteristics that might relate to beliefs and behaviors regarding COVID-19 vaccines. These, which were all measured in the same survey, include trust in public health and government officials, trust in peers (family and friends), social media use, interest in politics and news, political partisanship, political ideology, level of educational attainment, age, gender, religious identification, rural residency, and racial identification. We also include a measure of whether respondents are more concerned about COVID-19 or the vaccine. Since COVID-19 mitigation behaviors might also be influenced by state public policies and debates, we include state fixed effects for each model. Each of these variables is standardized and described in the Online Appendix.

Results

Table 1 shows ordinary least squares (OLS) estimates from regressing each outcome on feminist identity and the complete set of control variables described earlier. OLS estimates do not provide causal evidence of relationships but correlations that can be consistent or inconsistent with theoretical predictions. The evidence here provides a clear and robust answer to whether feminist identity is related to COVID-19 behaviors, behavioral intentions, and public policy preferences. Feminist identity is statistically significant in

five out of five models. In four of the models, the feminist identity coefficient is positive, indicating a more pro-vaccine orientation. Identification as a feminist relates to a greater propensity to obtain a COVID-19 vaccine, the intention to receive an annual vaccine booster, the intention to vaccinate one's hypothetical child, and support for pro-vaccine mandates.[12] These relationships are independent of beliefs in gender equality, trust in public and health officials, trust in peers, concern over COVID-19 (relative to the vaccine), partisanship, and political ideology. In the fifth model (beliefs about anti-vax protests), the coefficient is statistically significant and negative, also indicating a more pro-vaccine orientation. This provides support for H1–H5.

Comparing the effect size of feminist identity to other variables in the model shows that the substantive effect of feminist identification is equal to or greater than all other factors except for trust in national officials and concern over the harm of COVID-19. For instance, the marginal effect of feminist identity on vaccine status/intention (ME [marginal effect] = .09, SE [standard error] = .04) is less than the marginal effect of trust in national officials (ME = .44, SE = .04) and COVID-19 concern (ME = –.38, SE = .04). However, it is greater than the marginal effect of

Table 1: Feminist identity and beliefs toward COVID-19 vaccination

	Vaccine status	Vaccine booster	Vaccinate child	Vaccine mandates	Anti-vaccine protests
Feminist identity	0.09* (0.04)	0.14* (0.04)	0.17* (0.05)	0.03* (0.01)	–0.01* (0.01)
Gender equality	0.06 (0.05)	0.06 (0.04)	0.02 (0.05)	0.01 (0.01)	–0.01 (0.01)
Trust in officials	0.44* (0.05)	0.51* (0.04)	0.60* (0.05)	0.14* (0.01)	–0.04* (0.01)
Trust in peers	–0.07 (0.05)	0.00 (0.04)	–0.07 (0.05)	–0.01 (0.01)	0.04* (0.01)
COVID-19 vs vaccine risk	–0.39* (0.04)	–0.50* (0.04)	–0.62* (0.05)	–0.09* (0.01)	0.12* (0.01)
Social media use	0.03 (0.04)	0.04 (0.03)	0.10* (0.04)	0.01 (0.01)	–0.01 (0.01)
News interest	–0.04 (0.06)	0.09 (0.06)	0.07 (0.07)	0.03* (0.01)	–0.01 (0.01)
Partisanship	0.03 (0.04)	–0.08* (0.04)	–0.16* (0.05)	–0.06* (0.01)	0.01* (0.01)
Ideology	–0.02 (0.05)	–0.16* (0.04)	–0.19* (0.06)	–0.06* (0.01)	0.03* (0.01)
Education	0.09* (0.04)	0.02 (0.03)	0.00 (0.04)	–0.00 (0.01)	–0.00 (0.01)
Age	0.15* (0.04)	0.32* (0.04)	0.23* (0.05)	0.04* (0.01)	–0.02* (0.01)
Gender	–0.08 (0.08)	–0.05 (0.06)	–0.03 (0.08)	0.02 (0.01)	–0.00 (0.01)
Black	0.08 (0.12)	–0.05 (0.09)	0.13 (0.13)	0.07* (0.02)	0.02 (0.02)
Latino	–0.00 (0.14)	0.09 (0.12)	–0.11 (0.14)	0.02 (0.02)	–0.03 (0.02)
Asian	0.23 (0.12)	0.21 (0.13)	0.06 (0.18)	0.05 (0.03)	0.00 (0.02)
Other race	–0.07 (0.12)	–0.06 (0.10)	–0.14 (0.13)	–0.02 (0.02)	0.03 (0.02)
Rural resident	–0.20 (0.11)	–0.16 (0.09)	–0.13 (0.11)	–0.01 (0.02)	0.01 (0.02)
Protestant	0.12 (0.10)	0.03 (0.08)	–0.17 (0.10)	–0.03 (0.02)	0.03 (0.01)
Catholic	0.41* (0.09)	0.15 (0.08)	0.12 (0.10)	0.01 (0.02)	0.02 (0.01)
Intercept	3.07* (0.27)	3.66* (0.15)	4.21* (0.23)	0.53* (0.04)	0.43* (0.03)

Notes: * $p < .05$ (one-tailed). $N = 1{,}773$. Coefficients are OLS estimates with standard errors in parentheses and state-level fixed effects (not shown). Variables are standardized. Data weighted to the US population. Mean VIF = 1.93 (no signs of multicollinearity in the model).

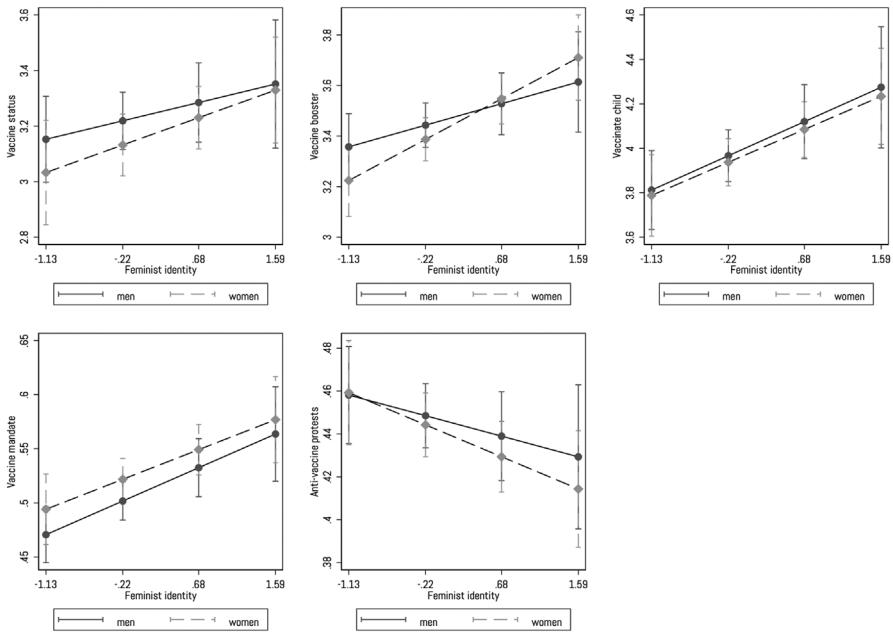
political ideology (ME = –.02, SE = .05) and partisan identification (ME = .02, SE = .04). Whereas partisanship and ideology are often viewed as the most important factor in COVID-19-related beliefs and behaviors (Grossman et al, 2020; Gadarian et al, 2022; Hao and Shao, 2022), we find that feminist identity is at least as important.

Feminist identity also has the ability to push right-leaning partisans in a direction more in line with the recommendations of public health officials. Our estimate of the predicted probability of being vaccinated increases by 13 percent as feminist identity moves from a non-feminist identifier to a strong feminist identifier for a Republican-conservative who has no trust in national officials. Although Republicans are less likely to identify as feminists than Democrats and independents, a non-trivial 23 percent of Republicans in the sample do identify as feminists, suggesting that this represents a substantive meaningful effect. Democrats, in contrast, can experience a ceiling effect. A Democrat-liberal who has high trust in national officials already has a 95 percent predicted probability of being vaccinated even if they do not identify as a feminist. If we move them from no feminist identification to strong feminist identification, the predicted probability of being vaccinated increases to 98 percent.

Heterogeneous effects

We fail to find a consistent interaction effect between feminist identity and gender identification, suggesting that feminist identity operates similarly among respondents identifying as women and men. Re-estimating the models in Table 1 to include an interaction between gender identification and feminist identity shows no significant gender difference in how feminist identity relates to each outcome.[13] Figure 2 shows

Figure 2: Effects of feminist identity and sex on vaccine-related beliefs



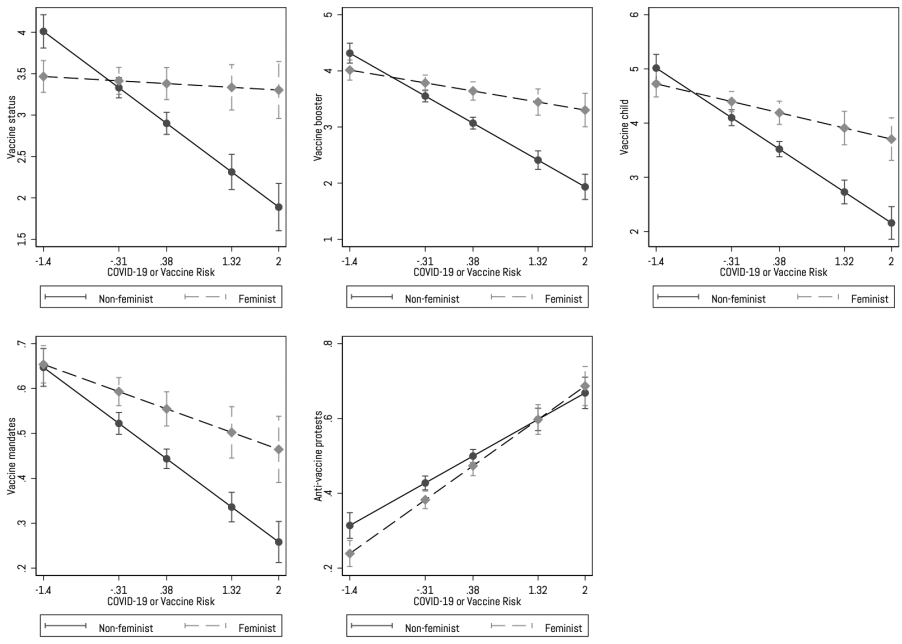
Note: Marginal effect (and 95 percent confidence intervals) of "feminist identity" (*y*-axis) on the specific vaccine-related outcome (*x*-axis) by respondent sex (men = black circles; women = gray diamonds).

these interaction effects for each vaccine-related outcome (for complete model estimates, see Table SM3 in the Online Appendix). The slopes for women and men are statistically equivalent for each outcome. The results also show that for most outcomes, there is no significant gender difference in vaccine mitigation outcomes at all levels of feminist identity. Thus, gender alone fails to explain vaccine behaviors, intentions, and policy preferences (see also Table SM2 in the Online Appendix).

Feminist identity and COVID-19/vaccine harm

Choosing to engage in potentially costly individual action or costly behavioral intentions in response to the pandemic demonstrates the significance of holding a feminist identity. To further demonstrate this relationship, we re-estimate the model in Table 1 including an interaction between feminist identity and whether the respondent is more concerned about harm from COVID-19 or the vaccine. This question states, "Being infected with COVID-19 is more likely to harm people than receiving a COVID-19 vaccination," measured from 1 (strongly disagree) to 5 (strongly agree). In Figure 3, we plot the marginal effect estimates for the interaction between feminist identity and COVID-19/vaccine risk perception (for complete model results, see Table SM1 in the Online Appendix). These estimates show the value of vaccination for high (max) and low (min) values of feminism over the perception of relative vaccine harm compared to infection from COVID-19. Panel 1 shows that among respondents more concerned about COVID-19 than

Figure 3: Effects of feminist identity and vaccine risks on vaccine-related beliefs



Note: Marginal effect (and 95 percent confidence intervals) of high (black circles) versus low levels (gray diamonds) of "feminist identity" on the specific vaccine-related outcome (*x*-axis) over respondents' beliefs about the comparative risks of the COVID-19 vaccine (*y*-axis), ranging from the belief that COVID-19 is more harmful to the belief that the vaccine is more harmful.

the vaccine, non-feminists and feminists have an equal likelihood of receiving the vaccine. As the perceived risk of the vaccine increases, the likelihood of being vaccinated declines. The decline is slight for feminists and much more dramatic for non-feminists. Among those most fearful of the vaccine, non-feminists are significantly more likely to decline the vaccine than feminists. In other words, feminist identity can offset some of the perceived costs associated with vaccination and motivate feminists concerned about potentially harmful vaccine side effects into compliance. We observe similar relationships for each of the outcomes except for support for anti-vaccine protests.

Conclusion and discussion

Consistent with our expectations, we find robust support across various outcomes that feminist identification correlates with vaccination uptake, future behavioral intentions to receive the vaccine, the intention to vaccinate one's child, and support for policies that mandate vaccination. Feminists are also less likely to express support for anti-vaccination activism. Moreover, the substantive effect of feminist identity is not trivial. Instead, it rivals or surpasses other political factors, such as ideology and partisanship. In some cases, it also exhibits a stronger effect among those on the Right than those on the Left given that those on the Left are often already inclined to support vaccination efforts.

We have posited that feminist identity has such a robust effect on COVID-19 mitigation efforts because of the inherent collectivist nature of the movement-related identities—something missing from mere beliefs about the value of gender equality. Although the survey data used in these analyses did not contain direct measures of collectivist attitudes,[14] numerous studies discuss the collective nature of feminist identification (see, for example, Crosby et al, 1996; Myaskovsky and Wittig, 1997; Liss et al, 2001; Polletta and Jasper, 2001; Lewis et al, 2019). Empirically, we find results consistent with this expectation.

This study has important policy implications regarding effective crisis mitigation efforts for different societal groups. In accordance with SIMCA, identifying as a feminist motivates engagement in action that would aid the group. When a person identifies as a feminist, they associate themselves with a group, perceive system-level injustice toward the group, and become willing to act on behalf of the group (Miller et al, 1981). In this case, this identity was translated into vaccination intention and behavior that could have an effect on the gendered disparities women experienced during the pandemic. Although vaccination does not eliminate these burdens, it leads to progress toward their resolution.

Our findings reinforce the need for policy campaigns to target relevant social identities, such as feminism, as this strategic targeting may lead to additional people engaging in the desired action, despite any cost associated with such action. Additionally, feminists may be even more responsive to public health messaging that is presented by a self-identified feminist. Research that examines the influence of explicit feminist messaging and the influence of a feminist messenger, could provide insight regarding the most effective ways to reach individuals with this identity and other relevant social identities. Particularly in times of crisis, such as the COVID-19 pandemic, the effective activation of the appropriate social identity may lead to outcomes that benefit both the marginalized group and the populace more broadly.

For instance, the spread of vaccination among feminists may have improved outcomes for the general population by mitigating the spread of the virus.

One limitation of our study is that we focus on outcomes that were proposed by various national and subnational governments. This means that we did not ask about hypothetical policies that might further reduce gender inequalities caused by the pandemic. We suspect that feminists might be even more supportive of policies that target the specific inequalities faced by women during the pandemic, which were almost completely absent from the mainstream political agenda during COVID-19. Testing how specific social identities, such as feminism, relate to support for and compliance with targeted versus universalistic policies in a public health setting is an important avenue for future research. Similarly, our data do not allow us to fully examine support for a variety of pharmaceutical and non-pharmaceutical pandemic response strategies. However, this should not detract from our findings, which strongly indicate that individuals who expressed stronger feminist identities were more likely to express stronger support for pharmaceutical pandemic responses, including their own intention to vaccinate, a preference for vaccinating children (which was highly controversial in many places), and support for vaccine mandates. It would, however, be useful to examine feminist support for additional, non-pharmaceutical responses, such as mask mandates, school closures, work-from-home policies, and so on. These could be particularly revealing, as we might expect that while feminists support policies that hasten the end of the pandemic, they might be less supportive of policies that would disproportionately burden women. Finally, future studies may wish to examine the complex ways that feminist identity intersects with alternative prosocial ideologies and group identities. While far beyond the scope of this article, it would be interesting to probe the extent to which feminist identification reinforces or competes with communitarian beliefs or whether it can offset the self-interest and exclusivity of more individualist ideologies. While interesting, we leave these questions to future studies.

Notes

[1] On minority racial and ethnic groups, see, for example, Tai et al (2021) and Wilder (2021); on immigrant communities and migrants, see, for example, Clark et al (2020) and Bhuiyan et al (2021); on economically disadvantaged groups, see, for example, Khanijahani and Tomassoni (2022); on the elderly, see, for example, CDC (2020); and on women, see, for example, UN Women (2020), Peck (2021), and O'Donnell et al (2021).

[2] The United Nations Development Programme (2021: 5) finds a mere 19.6 percent of all documented COVID-19 policy responses were "gender-sensitive" with a majority of these policies addressing the economic insecurity faced by women but not other "gender-sensitive" issues.

[3] Black women in particular were prevalent on the frontlines during COVID-19 while simultaneously disproportionately affected by comorbidities (Simien, 2020).

[4] However, it is worth noting that for many women, the reluctance to vaccinate was related to concerns about the potential impact of the vaccine on fertility or pregnancy (see, for example, Goncu Ayhan et al, 2021; Abassi, 2022; Yasmin et al, 2021).

[5] The feminist movement is best described as multiple interrelated movements, each with various (and sometimes competing) sets of beliefs and goals (see Delmar, 2018).

Distinction as to which version of the feminist movement citizens self-identify is inconsequential for this study because our concern is only that someone identifies with the collective movement rather than how they define the movement or perceive its goals.

[6] Many minority women refrain from identification with the feminist movement as a result of its historic lack of intersectionality (Collins, 1996; Robnett and Anderson, 2017). Although outside the scope of this analysis, future work should investigate how the experiences of this subgroup of women, as well as their identification or lack thereof with feminism, mediated how they perceived vaccinations and other mitigation efforts.

[7] All subjects were provided with a description of the research project and were required to complete an online consent form before responding to the survey. A copy of this consent form is available from the authors upon request. The Social Sciences Ethics Sub-committee at the University of Essex reviewed and approved the application for ethical approval of this study (ETH-2122-0259).

[8] A majority of these responses are respondents reporting a vaccination status (n = 1,944). We find consistent results to those reported here when we estimate vaccination status separate from vaccine intention.

[9] Responses to these questions are highly correlated. The Pearson correlation for vaccine status/intention and booster intention is .64, for vaccine status/intention and child vaccine is .56, and for booster intention and child vaccine is .72. We estimate these separately given that the latter two questions represent future hypotheticals despite sharing a similar underlying attitude toward the vaccine.

[10] Additionally, there is little reason to believe that the pandemic experience or participation in our survey challenged or reinforced core stereotypes about feminists, which is an important factor in shifting people's willingness to identify as a feminist (Moore and Stathi, 2020).

[11] The indicators reflecting concern for gender equality and the feminist identification variables are moderately correlated at .51. This relationship is equivalent for both men and women.

[12] We also estimated vaccine status separately from vaccine intention using a logistic regression for vaccine status and a regression for vaccine intention. In both models, feminist identity shows a positive and statistically significant coefficient, indicating that feminist identity robustly relates to vaccine status and intentions to receive the vaccine.

[13] We also estimate these models to examine any potential interaction between race and feminist identity. We do not find any interaction effect between these variables. However, as mentioned earlier, future research should continue to explore the interplay between race, gender, and feminism in the context of COVID-19 beliefs and mitigation efforts.

[14] We were unable to find any other COVID-19 surveys that measured such collectivist orientations, nor any that explicitly examined feminist identity.

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Conflict of interest

The authors declare that there is no conflict of interest.

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