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Reckless spreader or blameless victim? How vaccination status affects responses to COVID-19 patients

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ABSTRACT

Background: Vaccination against Covid-19 has become an increasingly polarizing issue in western democracies. While much research has focused on social-psychological determinants of vaccine hesitancy, less is known about the attitudes and behaviors of the vaccinated populations towards those who are unvaccinated. Building on Weiner's attribution theory (2005, 1985, 1980), we predict that vaccination status determines the attribution of personal responsibility and blame in Covid-19 social dilemmas. This in turn explains people's affective and behavioral responses towards those who have fallen ill or infected others with COVID-19.

Approach: Through two preregistered experiments (total $N = 1200$) we show that people attribute greater personal responsibility when unvaccinated (vs. vaccinated) people fall ill from, or infect others with COVID-19. This attribution of responsibility manifested in less sympathy towards unvaccinated COVID-19 patients, which was associated with a lower willingness to help patients and their families (Study 1). Likewise, higher perceived responsibility results in greater anger towards unvaccinated people who had (involuntarily) infected others with the virus, which was associated with a greater desire for punitive actions (Study 2).

Conclusion: These findings suggest that unvaccinated people experience blame as well as negative attitudes and behaviors from the vaccinated population. This could in turn strengthen people's refusal to get vaccinated and increase polarization between vaccine supporters and vaccine critics.

1. Introduction

Despite high COVID-19 vaccination rates in most OECD countries, significant proportions of the populations in these countries remain unvaccinated (Mathieu et al., 2021). For some, the COVID-19 vaccine has become a polarizing issue that has brought to light ideological, political and moral rifts within societies, communities and families (Cucciniello et al., 2021; Ward, 2016; Ward et al., 2020). While a lot of attention has been paid to the causes of vaccine hesitancy among the unvaccinated population (e.g., Machingaidze and Wiysonge, 2021; Soares et al., 2021), less research has explored the perceptions, attitudes and behaviors of the vaccinated populations towards those who are unvaccinated (e.g., Rosenfeld and Tomiyama, 2022).

Anecdotal evidence suggests that unvaccinated people, who in many western countries constitute a minority of the population, might face reduced compassion and even anger from health care professionals, because hospitalizations due to COVID-19 are now widely viewed as avoidable (Karkowsky, 2021). Simultaneously, unvaccinated people

often receive blame for spreading COVID-19 (Kampf, 2021), and opinion polls see support for mandatory vaccination and stricter measures against unvaccinated citizens rising (Savulescu, 2021). In some instances, unvaccinated people have suffered abuse on social media, sometimes even after they have died from COVID-19 (Levin, 2021).

Here we build on Weiner's (2005, 1985, 1980) attribution theory to evaluate how the vaccination status determines the attribution of personal responsibility and blame, which predicts differences in affective and behavioral responses towards people who have fallen ill or infected others with COVID-19. Specifically, we investigate how vaccination status determines (1) willingness to help critically ill COVID-19 patients and their families, as well as (2) the desire to punish people who have (involuntarily) infected others with the virus.

Based on the early work of Heider (1958), Weiner's attribution model posits that people engage in causal exploration following an event to understand its occurrence. These causal explorations provide guidance for emotional and behavioral responses to that event (Weiner, 2005). During the causal exploration, people assess various dimensions

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of the perceived cause of the event, which form the basis for subsequent judgements and inferences of a person's responsibility and blame (e.g., Corrigan, 2000; Weiner, 1985). The theory posits that attribution of responsibility principally depends on the perceived controllability (i.e., whether a person is to blame for an event), locus of causality (i.e., whether an event is caused by something internal or external), and stability (i.e., whether the event is enduring).

Research across a broad range of social transgressions shows that perceptions of high responsibility tend to evoke feeling of anger or avoidance, whereas judgements of minimal personal responsibility elicit feelings of sympathy or concern. These emotional responses in turn influence behaviors, with research showing that anger can motivate aggressive or punitive actions (Wickens et al., 2011; Yao and Siegel, 2021), whereas sympathy has been attributed to pro-social behaviors like willingness to help (e.g., Dijker and Koomen, 2003; Weiner, 1980). For example, a study by Muschetto and Siegel (2019) found that perceiving depression as a controllable condition elicited more anger and less sympathy towards individuals suffering from depression, and in turn reduced willingness to provide social supports. Likewise, Sperry and Siegel (2013) found that sympathy for victims of sexual violence and rape was higher when people attributed lower responsibility to the victim, which in turn positively influenced willingness to help the victim, as well as the recommended severity of verdicts. In the context of COVID-19, Yao and Siegel (2021) found that people's desire to punish an infected person who had boarded a flight was higher when they attributed greater responsibility i.e., when the person had boarded the flight despite a positive test for COVID-19.

The aim of the present study is to bridge Weiner's attribution model with the emerging COVID-19 vaccination literature to explain the relationship between vaccination status, attribution of responsibility, and responses to COVID-19 patients and COVID-19 spreaders. COVID-19 vaccinations significantly reduce transmissibility as well as hospitalizations and mortality rates from COVID-19 (e.g., Haas et al., 2021; Polack et al., 2020). Severe illness or deaths related to COVID-19 are now widely viewed as controllable, if not avoidable outcomes.

We thus predict that people will attribute greater responsibility when an unvaccinated person, compared to a vaccinated person falls ill from COVID-19 (Study 1) or when an unvaccinated person spreads COVID-19 to others (Study 2) (H1). In the context of COVID-19 patients (Study 1), we predict that others are less willing to help unvaccinated (vs. vaccinated) people when they fall ill. Specifically, we predict that this is because unvaccinated (vs. vaccinated) patients receive less sympathy from others when they fall ill (H2), which mediates the effect of vaccination status on willingness to help (H3). These hypotheses build on attribution research from other domains, which shows that attribution of responsibility results in lower levels of sympathy towards patients, which in turn is associated with lower pro-social behaviours like helping (e.g., Dijker and Koomen, 2003).

Furthermore, we aim to replicate these findings in a context where a person (involuntarily) spreads COVID-19 to others (Study 2). We predict that people show a greater desire to punish unvaccinated (vs. vaccinated) people when they have (involuntarily) infected others with COVID-19. Specifically, we predict that others feel greater anger towards unvaccinated (vs. vaccinated) spreaders of COVID-19 (H2), which mediates the effect of vaccination status on desire to punish (H3). Again, we base our predictions on research which shows that attribution of responsibility determines the level of anger people feel towards social transgressors, which is positively associated with people's desire for punitive actions (e.g., Wickens et al., 2011). It needs to be noted that our pre-registration did not explicitly mention the involuntary aspect of the study. However, to avoid confusion about the motivation of the spreader, participants learned that the spreader only found out *after* the event that (s)he had Covid-19, thus ruling out the possibility that the spreader might have deliberately infected others.

It also needs to be noted that our pre-registration included predictions about a potential gender effect. We predicted that, on average,

sympathy and willingness to help are higher when a victim of Covid-19 is female (vs. male), and that anger and desire for punishment are higher when a spreader is male (vs. female). For example, research shows that women are more often viewed as more 'moral patients' who deserve greater compassion, while men are more often seen as more 'moral agents' who deserve greater punishment (e.g., Reynolds et al., 2020). The rationale for manipulating gender was thus to account for and to evaluate potential gender biases regarding the attribution of responsibility.

Finally, we test whether our predictions are conditional upon the vaccination status of the respondent. Previous work has investigated how characteristics of the *actor* influence the attribution of responsibility (e.g., Gleason and Harris, 1976; Kleinke and Baldwin, 1993). For example, studies show that victims of rape are attributed greater responsibility when they had voluntarily consumed substances like alcohol or drugs before the assault (e.g., Angelone et al., 2007). However, less is understood about how *respondent* characteristics influence the attribution of responsibility. Although findings tend to depend on contextual factors, a limited number of studies have shown that respondent specific characteristics like age (Fincham and Jaspars, 1979), gender (Crittenden and Wiley, 1980), or attribution style (Henry and Campbell, 2019) can influence the attribution of responsibility. However, few studies have investigated how respondents' situational or individual differences influence their attribution of responsibility. A recent study by Yin et al. (2022) constitutes a notable exception. Their study shows that respondents who were high in power misperceived others (even low-power others) as having more choice, which resulted in high-power respondents assigning more blame to others for poor performance, as well as in a greater desire for punishment (Yin et al., 2022, p. 170). Similarly, people who have opted for the vaccine (vs. unvaccinated) may feel more strongly that contracting or spreading COVID-19 are preventable events, which are due to personal choice of getting vaccinated. As a result, vaccinated (vs. unvaccinated) respondents are likely to assign greater responsibility to unvaccinated victims or spreaders of COVID-19, which may result in more adverse emotional and behavioral reactions towards them. By investigating this possibility, we hope to further highlight the importance of accounting for respondent differences in attribution studies.

2. Methods and materials

To test these hypotheses, we conducted two controlled experiments with large samples of the North American population (total N = 1200). Both experiments were pre-registered at [aspredicted.org](https://aspredicted.org/z9qv3.pdf) (<https://aspredicted.org/z9qv3.pdf>). Data were collected between 3pm and 5pm (MDT) on November 17th, 2021 and participants were recruited from Prolific Academic (Peer et al., 2017). We had pre-registered a medium effect size (Cohen's $d = 0.5$) and a statistical power level of 0.85 for this study, which meant that we needed a minimum of 142 participants per condition to obtain a power of .95 for a two-tailed hypothesis test. Our studies had received prior approval from the Office of Research Ethics at University College Dublin (HS-E-21-168-Claudy). We obtained written informed consent from all participants. We informed them that participation was voluntary and that they could drop out at any time. Both studies measured the gender, age, and vaccination status of the participants. Demographic information and sample sizes for both studies are presented in Table 1. Participants labelled as 'vaccinated' had received at least one dose of a COVID-19 vaccine at the time of the survey.

In the experiments we asked participants to imagine a scenario in which a distant acquaintance had fallen critically ill from COVID-19 (Study 1), and in which a person had involuntarily infected others with the virus (Study 2). Both vignette-based experiments utilized a between-subject design, in which we varied the vaccination status (vaccinated vs. unvaccinated) and gender (male vs. female) of the patient (Study 1) and spreader (Study 2). We also controlled for and measured the moderating influence of participants' own vaccination

Table 1
Samples' demographic information.

	N recruited	N retained ^a	% Female	Age M	Age SD	Vaccinated
Study 1	600	589	47.7%	32.99	11.92	88.3%
Study 2	600	578	48.4%	33.60	12.84	86.3%

^a We eliminated responses from participants who failed attention check questions.

status.

All participants were blind to the conditions of the experiments. We then measured perceived responsibility, affective responses, and behavioral intentions in both studies. **Table 2** provides a detailed overview of the measurement scales used for each construct, while **Table 3** provides the descriptive statistics for the focal constructs. Studies also included attention checks, which resulted in the exclusion of participants who failed those checks (**Table 1**). The complete stimulus material, questionnaire and data can be publicly accessed in the supplementary material.

Test statistics presented in this research are all two-sided. The moderated-mediation analyses (Hayes, 2015) were analysed with the PROCESS macro (Model 7). While assumptions of normality were not formally tested, the mediation analyses provided confidence intervals (CIs) that were generated via bootstrapping with 5000 iterations and were not based on normality assumptions for valid inferences. We used an index of moderated mediation to test the significance of the moderated mediation, i.e., the difference of the indirect effects at different vaccination status of the respondents (Hayes, 2015). Regarding effect sizes, we report partial eta squared η_p^2 for the analysis of variance (Cohen, 1988; Lakens, 2013). Specifically, a η_p^2 of 0.01 is considered a small effect size, whereas a 0.06 is considered a medium effect size, and 0.14 is considered large. Finally, we report R^2 and standardized regression coefficients for the moderated-mediation analyses (Fairchild et al., 2009; Preacher and Kelley, 2011).

3. Study 1: Willingness to help COVID-19 patients and their families

In the first study, we evaluated the impact of critically-ill COVID-19 patients' vaccination status on other people's willingness to help these patients and their families. We recruited 600 participants via Prolific Academic to complete this study in return for monetary compensation. Eleven participants failed the attention checks and were excluded from the analysis. The final sample consists of $N = 589$ participants (47.7% female, 2.5% other; $M_{age} = 32.99$, $SD_{age} = 11.92$).

Participants were randomly assigned to one of four conditions of a 2 (patient vaccination status: vaccinated vs. unvaccinated) X 2 (patient gender: male vs. female) between-subjects design. Participants were asked to imagine that a distant acquaintance (male vs. female; vaccinated or unvaccinated) had recently been diagnosed with COVID-19, and was now critically ill in hospital. After reading the scenario, participants were asked to indicate their *willingness to help* the patient and their immediate family, which was measured on a five-item scale ($\alpha = .86$; anchored from 1 = "extremely unlikely" to 5 = "extremely likely"). We then measured participants' *sympathy* ($\alpha = 0.89$; anchored from 1 = "strongly disagree" to 5 = "strongly agree") and *perceived responsibility* ($\alpha = 0.97$; anchored from 1 = "strongly disagree" to 5 = "strongly agree").

3.1. Results

3.1.1. Attribution of responsibility

A two-way ANOVA with patient's gender and vaccination status as

Table 2
Measurement of main constructs.

Construct	Measurement	Cronbach's α	Source
Attributed Responsibility (Study 1 & 2)	e.g.(1) James could have prevented this situation; (2) James is responsible for having caught COVID-19; (3) This situation is James's own fault. (1 = "strongly disagree" to 5 = "strongly agree")	$\alpha = .97$; 6 items	Adapted from Wickens et al. (2011)
Sympathy (Study 1)	I feel sympathy/pity/compassion/kindness for James (1 = "strongly disagree" to 5 = "strongly agree")	$\alpha = .89$; 4 items	Adapted from Siegel et al. (2012) Sperry and Siegel (2013)
Willingness to help (Study 1)	e.g., (1) Suppose there is a way to help James, to what extent do you think you would do so?; (2) Suppose James' friends and family are trying to raise money to cover his medical bills. How likely would you be to donate money to help James?; (3) Suppose James' friends had set up a crowd-funding website to help him. How likely would you be to share this website with your friends and family on social media? (1 = "extremely unlikely" to 5 = "extremely likely")	$\alpha = .86$; 5 items	Adapted from Sperry and Siegel (2013)
Desire to punish (Study 2)	To what extent do you think James should be punished? Please state whether you agree or disagree with the following statements. e.g., (1) James should be punished by the law; (2) James should be legally liable for his actions; (3) James should be condemned by society. (1 = "strongly disagree" to 5 = "strongly agree")	$\alpha = .89$; 4 items	Adapted from Wickens et al. (2011); Yao and Siegel (2021)
Anger (Study 2)	Imagine that you were also at the party. To what extent would you feel each of the following emotions towards James? Anger/Resentment/Outrage/Contempt (1 = "not at all"; 5 = very much so")	$\alpha = .93$; 4 items	Adapted from Siegel et al. (2012); Muschetto and Siegel (2019)

Table 3
Descriptive statistics.

Variables	Mean	SD	Min	Max
<i>Study 1</i>				
Attributed responsibility	2.81	1.34	1	5
Sympathy	3.81	1.07	1	5
Willingness to help	3.38	1.04	1	5
<i>Study 2</i>				
Attributed responsibility	3.97	1.03	1	5
Anger	3.58	1.21	1	5
Desire to punish	2.49	1.16	1	5

independent variables and *perceived responsibility* of the patient as the dependent variable reveals a lack of an interaction effect ($F(1, 585) = 0.32, p = .58$), as well as the absence of a main effect of the patient's gender ($F(1, 585) = 0.78, p = .38$). However, there is a significant main effect of the patient's vaccination status ($F(1, 585) = 466.12, p < .001, \eta_p^2 = 0.443$), such that the attribution of responsibility is greater for unvaccinated patients ($M = 3.69, SD = 1.08$) than for vaccinated patients ($M = 1.92, SD = 0.91$). The findings suggest a large effect size (Cohen, 1988). The results thus provide initial support for hypothesis 1. Because there was no effect of gender or interaction between gender and vaccination status, moving forward, we only report descriptive statistics as well as ANOVA results collapsed across genders, unless otherwise specified.

3.1.2. Sympathy towards patients

A two-way ANOVA with patient's gender and vaccination status as independent variables and sympathy towards the patient as the dependent variable reveals a lack of an interaction ($F(1, 585) = 0.86, p = .36$), as well as the main effect of the patient's gender ($F(1, 585) = 0, p = .99$). However, there is a main effect of the patient's vaccination status ($F(1, 585) = 197.21, p < .001, \eta_p^2 = 0.252$), such that sympathy is greater for vaccinated patients ($M = 4.35, SD = 0.67$) as compared to the unvaccinated patients ($M = 3.27, SD = 1.13$). The significant and large differences thus provide initial support for hypothesis 2.

3.1.3. Willingness to help patients

Similarly, a two-way ANOVA with patient's gender and vaccination status as independent variables and willingness to help the patient as the dependent variable also reveals the lack of an interaction ($F(1, 585) = 0.03, p = .85$), as well as the main effect of the patient's gender ($F(1, 585) = 0.07, p = .79$). However, there is a main effect of the patient's vaccination status ($F(1, 585) = 110.78, p < .001, \eta_p^2 = 0.159$), such that there is a greater willingness to help vaccinated patients and their families ($M = 3.79, SD = 0.81$), compared to unvaccinated patients ($M = 2.96, SD = 1.08$). Again, the effect size can be considered large. It is important to note that the observed effects of the patient's vaccination status in the two-way ANOVA models on perceived responsibility, sympathy, as well as the willingness to help variables persist when participants' age and gender are added as covariates in the model, indicating the robustness of the observed effects. Furthermore, participants rated the scenarios presented to them as realistic ($M = 5.82, SD = 1.14; t = 38.72; p < .001$) and easy to imagine ($M = 5.35, SD = 1.53; t = 21.38; p < .001; test\ values = 4$).

3.1.4. Moderated-mediation analysis

To test Weiner's (1985, 2005) attribution model in the context of COVID-19 vaccinations, a bootstrap moderated-mediation analysis (Model 7; Hayes, 2015) was used to test the sequential relationship between the patient's vaccination status (unvaccinated or vaccinated),

sympathy towards the patient, and willingness to help the patient; as well as the moderating nature of the participants' own vaccination status (unvaccinated '0' or vaccinated '1') on sympathy felt for the patient. Participants' gender and age were added as covariates in the model. The expectation was that the patient being vaccinated (vs. unvaccinated) should evoke greater sympathy, resulting in a greater willingness to help the patient. Furthermore, the observed effect should be stronger in responses indicated by vaccinated participants but not among participants who are themselves unvaccinated.

Results support this conceptualization (Fig. 1a; Table 4). First, there was a significant interaction of patient's vaccination status and the participant's own vaccination on the sympathy felt for the patient (interaction effect = 1.553, $p < .001$). More importantly, the indirect path (patient's vaccination status \rightarrow sympathy \rightarrow willingness to help) was significant (indirect effect = 0.931, 95% confidence interval [CI] = [0.803, 1.066], 5000 samples) and fully mediated the relationship (as the direct effect was sublimated: direct effect $\beta = 0.044, p = .51$) between patient's vaccination status and willingness to help the patient when the participants were themselves vaccinated, but not when the participants were themselves unvaccinated (indirect effect = -0.207 , 95% confidence interval [CI] = $[-0.434, 0.018]$, 5000 samples). Hence, participants' own vaccination status moderated the mediating effect of sympathy on willingness to help the patient, depending on the patient's vaccination status. (Index of moderated mediation = 1.1382, 95% confidence interval [CI] = [0.8842, 1.4149], 5000 samples). The absence of zero in the CI of the index of moderated mediation, along with the observed significance of the path coefficients under different values of the moderator indicates that mediation (via sympathy) occurs only for participants who are vaccinated. The observed model statistic (Model $R^2 = 0.378; p < .001$; see Table 4) also speaks to the substantive nature of the observed moderated mediation effect (Preacher and Kelley, 2011). The results taken together lend initial support for hypothesis 3.

Furthermore, the findings provide initial evidence that respondents who are vaccinated make different attributions based on vaccination status of COVID-19 patient, while unvaccinated respondents make similar attributions irrespective of the patient's vaccination status.

To summarize, the findings support our predictions that (vaccinated) people attribute greater personal responsibility for falling ill when patients are unvaccinated. More importantly, a patient's vaccination status determines the extent to which other (vaccinated) people indicate willingness to help COVID-19 patients, driven by sympathy felt. There is greater sympathy and consequently greater willingness to help vaccinated (vs. unvaccinated) patients. This effect is observed strongly among participants who are themselves vaccinated, but there is no such difference among responses of unvaccinated participants.

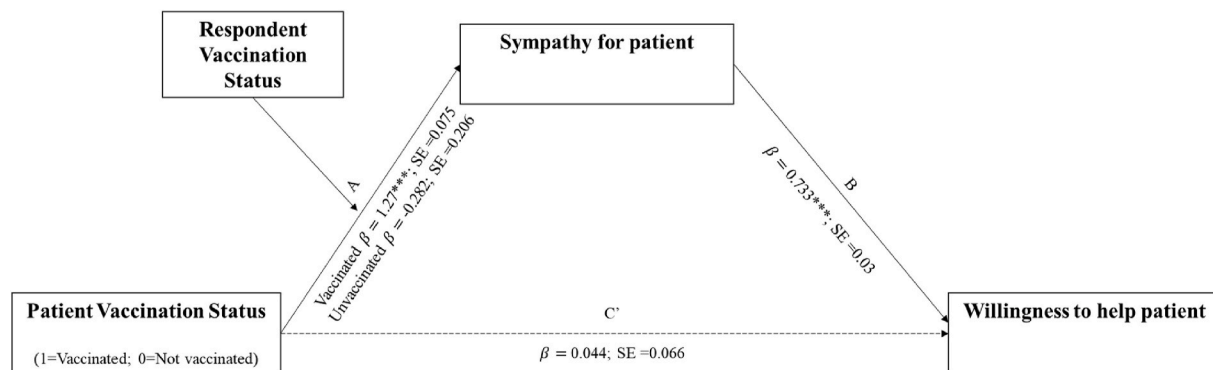


Fig. 1a. Conditional indirect effect of patients' vaccination status on willingness to help via sympathy, for vaccinated vs. unvaccinated respondents. * $p < .05$; ** $p < .001$; *** $p < 0.0001$; coefficients are unstandardized.

Table 4
Effect of vaccination status on affect and behavioural intent.

	Mediator Variable Model							
	Sympathy				Anger			
	β	se	t	CI [LL; UL]	β	se	t	CI [LL; UL]
Patient/spreader vaccination status (0 = unvaccinated; 1 = vaccinated)	-0.282	0.206	-1.373	[-.687; .122]	0.059	0.243	0.243	[-.419;.537]
Respondent vaccination status (0 = unvaccinated; 1 = vaccinated)	-1.319***	0.148	-8.925	[-1.610;-1.029]	1.766***	0.185	9.532	[1.402; 2.129]
Other vaccination status X Own vaccination status	1.553***	0.219	7.098	[1.124; 1.983]	-1.080***	0.260	-4.148	[-1.592; -.569]
Dependent Variable Model								
	Willingness to help				Desire to punish			
	β	se	t	CI [LL; UL]	β	se	t	CI [LL; UL]
Patient/spreader vaccination status	0.044	0.066	0.667	[-.085;.172]	-0.462**	0.076	-6.061	[-.611;-.312]
Sympathy	0.733***	0.031	23.512	[.672; .794]	-	-	-	-
Anger	-	-	-	-	0.553***	0.031	17.581	[.491; .614]
Conditional indirect effect (Respondent vaccination status)								
	β	BootSE	CI [LL; UL]		β	BootSE	CI [LL; UL]	
Vaccinated	0.931***	0.067	[.803; 1.066]		-0.564***	0.054	[-.671;-.463]	
Not vaccinated	-0.207	0.117	[-.434; .018]		0.033	0.169	[-.299;.363]	
Overall Model	$R^2 = 0.378***$				$R^2 = 0.272***$			

*p < .05; **p < .001; ***p < .0001.

4. Study 2: Desire to punish ‘spreaders’ of COVID-19

In study 2, we tested if people had a greater desire to punish unvaccinated (vs. vaccinated) people who had involuntarily infected others. Six hundred participants recruited via Prolific Academic completed this study in return for monetary compensation. After excluding 22 participants who failed the attention check, our final sample consisted of N = 578 (48.4% female, 1.9% other; $M_{age} = 33.60$, $SD_{age} = 12.84$). Participants were randomly assigned to one of four conditions of a 2 (spreader vaccination status: vaccinated vs. unvaccinated) X 2 (spreader gender: male vs. female) between-subjects design.

Participants were asked to imagine a scenario in which a person (vaccinated vs. unvaccinated; male vs. female), despite feeling slightly unwell, attended a friend’s birthday party. Participants then learned that two days after the event the person had tested positive for COVID-19. While (s)he was quickly recovering, several other guests had since fallen very ill and were now being treated in hospital. Participants were then asked about their *desire to punish* (e.g., Yao and Siegel, 2021) the person who had infected others with COVID-19 ($\alpha = 0.89$; anchored from 1 = “strongly agree” to 5 = “strongly disagree”). Next, we asked participants about their *anger* towards the spreader ($\alpha = 0.93$; anchored from 1 = “not at all” to 5 = “very much so”), as well as *perceived responsibility* ($\alpha = 0.95$; anchored from 1 = “strongly disagree” to 5 = “strongly agree”). Lastly, participants’ demographic information, as well as their vaccination status were collected.

4.1. Results

Participants rated the scenario presented to them as realistic ($M = 6.26$, $SD = 0.86$; $t = 63.28$; $p < .000$; *test value* = 4) and easy to imagine ($M = 5.85$; $SD = 1.30$; $t = 34.25$; $p < .000$; *test value* = 4).

4.1.1. Attribution of responsibility

Findings from a two-way ANOVA with vaccination status and gender of the spreader as independent variables, and *perceived responsibility* as the dependent variable show that participants attributed greater responsibility for spreading COVID-19 when the person was unvaccinated ($M = 4.33$, $SD = 0.83$), as compared to when the person was vaccinated ($M = 3.62$, $SD = 1.1$; $F(1, 574) = 77.30$, $p < .001$; $\eta_p^2 = 0.12$), suggesting a medium-to-large effect size. Furthermore, the attribution of responsibility did not vary significantly depending on the person being

male ($M = 4.02$, $SD = 0.97$) or female ($M = 3.93$, $SD = 1.09$; $F(1, 574) = 1.558$, $p = .21$). The results thus lend further support to hypothesis 1, which stated that people attribute greater responsibility to unvaccinated people when they involuntarily infect others with the virus. Due to the non-significant gender effect, moving forward, we only report findings collapsed across genders.

4.1.2. Anger towards the spreader

Consistent with our predictions, a two-way ANOVA analysis reveals that participants feel more anger when the spreader was unvaccinated ($M = 4.02$, $SD = 1.05$) as compared to vaccinated ($M = 3.15$, $SD = 1.21$; $F(1, 574) = 86.48$, $p < .00$; $\eta_p^2 = 0.13$), indicating a medium-to-large effect. The results thus provide further support for H2.

4.1.3. Desire to punish spreaders

A two-way ANOVA also suggests that participants express a greater desire to punish the spreader who is unvaccinated ($M = 2.96$, $SD = 1.15$) as compared to vaccinated ($M = 2.02$, $SD = 0.97$; $F(1, 574) = 110.98$, $p < .001$; $\eta_p^2 = 0.16$).

4.1.4. Moderated-mediation analysis

Next, we tested whether the influence of vaccination status on people’s desire to punish a person for passing on COVID-19 to others was mediated by anger. Age and gender of the participants were included as covarites. Results show the existence of a partial mediation of anger on the desire to punish the spreader depending on the vaccination status. The indirect path (patient’s vaccination status → anger → desire to punish) was significant (indirect effect $\beta = -0.564$, 95% confidence interval [CI] = $[-0.671; -0.463]$, 5000 samples) and partially mediated the relationship (as the direct effect was lessened: $\beta = -0.462$, $p < .001$) between the spreader’s vaccination status and the desire to punish the person when the participants were themselves vaccinated, but not when the participants were themselves unvaccinated (indirect effect = 0.033, 95% confidence interval [CI] = $[-0.299, 0.363]$, 5000 samples). Hence participants’ own vaccination status once again moderated the affective response to people passing on COVID-19 to others (index of moderated mediation = -0.597 , 95% confidence interval [CI] = $[-0.953, -0.234]$, 5000 samples). The absence of zero in the CI of the index of moderated mediation, along with the observed significance of the path coefficients under different values of the moderator, indicate that mediation (by anger) occurs only when participants are vaccinated. The observed

overall model statistic (Model $R^2 = 0.272; p < .001$; see Table 4, Fig. 1b) also indicate the significant nature of the observed moderated mediation effect (Preacher and Kelley, 2011). The findings thus lend further support to hypothesis 3. Results also provide additional evidence that respondents' own vaccination status plays an important role in the attribution of responsibility and their subsequently experienced emotions towards (vaccinated and unvaccinated) spreaders of COVID-19.

5. Discussion and conclusion

While unvaccinated people are at a greater risk of experiencing severe illness, hospitalization, and death from COVID-19 (Haas et al., 2021), our findings highlight that they might also experience adverse social consequences. Based on Weiner's attribution model (1985, 2005), this study sheds light on why unvaccinated populations might be subjected to negative affect and behaviors from vaccinated majorities. Our findings show that people attribute greater responsibility when unvaccinated (vs. vaccinated) people fall ill from, or infect others with COVID-19. Specifically, we find that the attribution of responsibility manifested in less sympathy towards unvaccinated COVID-19 patients, which in turn resulted in lower willingness to help patients and their families. Likewise, higher perceived responsibility resulted in greater anger towards unvaccinated people who had (involuntarily) infected others with the virus, which is positively associated with a greater desire for punitive actions.

An important finding emerging from this study is that attribution of responsibility and subsequent emotional reactions differ significantly between vaccinated and unvaccinated respondents. The finding contributes to a growing body of research, which shows that characteristics of the respondent as well as situational differences can influence the attribution of responsibility. While early research has mainly focused on differences in attribution, for example, between men and women (e.g., Crittenden and Wiley, 1980) or people of different ages (Fincham and Jaspars, 1979), fewer studies have investigated how individual and situational differences shape the attribution of responsibility (e.g., Yin et al., 2022). Like Yin et al. (2022) who found that people's level of power determines how much responsibility they attribute to underperforming individuals, our findings show that respondents' vaccination status impacts attribution. Specifically, we find that people who are vaccinated make different attributions based on the vaccination status of the person in need of help (i.e., COVID-19 patient), but people who are not vaccinated make similar attributions regardless of the patient's vaccination status. The same finding emerged in the context of social transgression, i.e., the vaccination status of the person who spread COVID-19 to others has little influence when the person making the attributions is not vaccinated.

However, we can only speculate why we find differences in attribution between vaccinated and unvaccinated respondents. For example, Yin et al. (2022) found that high-power (vs. low-power) people viewed

others as having more choice, which explained why they attributed greater blame for poor performance. In our context, one simple explanation might be that unvaccinated people do not believe in the effectiveness of the vaccine, in which case falling ill from or spreading COVID-19 might seem like uncontrollable events, irrespective of vaccination status of the patient or spreader. Vaccinated people on the other hand might believe that vaccines are an effective way to control COVID-19, which would explain why they attribute greater responsibility to unvaccinated people when they fall ill or pass on COVID-19 to others. Future research should further investigate which (individual) differences between vaccinated and unvaccinated people might explain variations in the attribution of responsibility and subsequent emotional and behavioral reactions towards COVID-19 patients and spreaders.

While previous research has focused on the social-psychological determinants of vaccine support or vaccine hesitancy (Yaquib et al., 2014), this research examines the interaction between the two positions. The increasing polarization between vaccine supporters and sceptics will continue to play a major role in COVID-19 vaccination rollouts. For example, Romer and Jamieson (2021, 2020) show that conspiratorial thinking, primarily among users of conservative media, feeds into cohorts' vaccine hesitancy. However, our findings suggest that there are not just imagined, but real and concrete reasons for why vaccine sceptics may feel under siege i.e., vaccinated cohorts are more likely to hold negative attitudes, are less willing to help, and are more likely to punish the unvaccinated. Such attitudes and behaviors may (inadvertently) reinscribe the marginality and siege mentality of the unvaccinated. In other words, those who refuse vaccines see proof of their position manifest in real-felt attitudes and behaviors towards them. If social networks and social support are important factors in one's ability to overcome illness, reducing risk-taking with one's health as well as bolstering general well-being (Reblin and Uchino, 2008; Wills and Ainette, 2012), then the perceived isolation from the social fabric may manifest in real and negative health outcome.

This study thus also contributes to research that suggests vaccination status forms part of one's (moral) identity (Rosenfeld and Tomiyama, 2022; Rossen et al., 2019). Unvaccinated individuals might feel socially excluded, but come to regard this as part of their social identities, an important differentiator to the vaccinated cohorts. For example, Rosenfeld and Tomiyama (p.1) found that moral reproach i.e., "the feeling, among unvaccinated people, that vaccinated people are judging them as immoral" resulted in stronger refusal to get vaccinated against COVID-19. Similarly, experiencing blame for the ongoing pandemic might strengthen people's refusal to get vaccinated.

While our study helps to shed light on how the attribution of responsibility results in adverse social consequences for unvaccinated people, future research could shed light on antecedents of perceived responsibility regarding Covid-19 vaccinations. People not only get vaccinated to gain protection from the virus, but many view vaccination

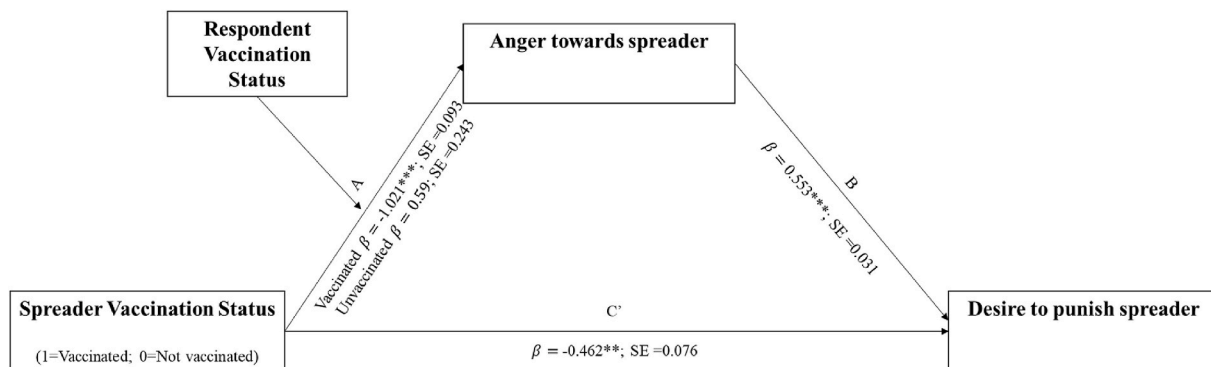


Fig. 1b. Conditional indirect effect of spreaders' vaccination status on desire to punish via anger, for vaccinated vs. unvaccinated respondents. *p < .05; **p < .001; ***p < .00001; coefficients are unstandardized.

as moral duty to protect others and to help end the pandemic. Furthermore, in this study we had asked participants to imagine that a 'distant acquaintance' had fallen critically ill or had infected others. While this approach is consistent with prior research, future studies might want to investigate whether the observed patterns hold in relation to immediate family or friends, as people might react differently when it comes to 'close others'.

Another important question arising from this research is whether vaccination is a public health issue that has become politicised (Ward et al., 2020; Yaqub et al., 2014) or whether it is a manifestation of a broader erosion of trust in institutions. If it is the former, then strategies to rebuild trust with the vaccine hesitant are valid. If it is the latter, then public health is a sub-set of a broader political polarization that requires timescales and resources longer term than the COVID-19 pandemic. Thus, attempts to (re)build trust in medical institutions may backfire, and future research could investigate the effectiveness of (communication) strategies that aim to defuse the potency of vaccination status as a political divider (e.g., Feinberg and Willer, 2019).

CRedit author statement

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2022.115089>.

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