Distrustful complacency and the COVID-19 vaccine: How concern and political trust interact
to affect vaccine hesitancy

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Abstract

We test the hypothesis that COVID-19 vaccine hesitancy is attributable to ‘distrustful complacency’ – an interactive and not just additive combination of concern and distrust.

Across two studies, 9695 respondents across 13 different parts of Britain reported their level of concern about COVID-19, trust in the UK government, and intention to accept or refuse the vaccine. Multilevel regression analysis, controlling for geographic area and relevant demographics, confirmed the predicted interactive effect of concern and trust. Respondents with both low trust and low concern were 10%-22% more vaccine hesitant than respondents with either high trust or high concern, and 20%-29% more hesitant than respondents with both high trust and high concern. Results hold equally among White, Black, and Muslim respondents, consistent with the view that, regardless of mean level differences, a common process underlies vaccine hesitancy, underlining the importance of tackling distrustful complacency both generally and specifically amongst unvaccinated individuals and populations.

Statement of Relevance

Countries across the globe require a high proportion of their populations to accept vaccines against COVID-19. Some are much further ahead than others and some target particular groups that are supposedly more hesitant than others. The present work, examining population samples from multiple locations and different ethnic groups in the UK, shows that a common psychological pattern is associated with greater vaccine hesitancy. Based on psychological theories we predicted and found consistently that a combination of both low political trust and low concern about COVID-19 created substantially greater propensity for hesitancy than either low trust or low concern alone. This holds true across all groups, in line with the proposition that a common social psychological process is at work. Our findings point to two clear avenues for public health intervention to maximize vaccine uptake and are also of theoretical relevance for political, health, social, community and applied psychology.

Distrustful complacency and the COVID-19 vaccine: How concern and political trust interact to affect vaccine hesitancy

At the time of writing, after a year of the global coronavirus pandemic millions of lives has been lost globally, and over 126,000 in the UK alone (McKie, 2021). The UK vaccination programme, initiated in December 2020, has now reached over 25,000,000 people with a first dose and over 2,000,000 with their second. Vaccines have been described by the UK health secretary Matt Hancock, as “the way out of this pandemic” (BBC News, 2021). But vaccines alone will not eradicate the virus and non-pharmaceutical interventions must continue for a while longer (International Federation of Red Cross, 2021).

The success of national vaccination campaigns is central to being able to re-open national economies and improve people’s lives and wellbeing. Therefore, it is vital to understand the psychology of vaccination hesitancy. Even where a large majority are willing to receive the vaccine (cf, McDonnell, 2020a), a significant proportion remain “vaccine hesitant”, perhaps reinforced internationally by temporary halts in national rollouts whilst awaiting safety certification (as has substantially affected European Union countries; Leask, 2021), or by anti-vaxxer misinformation campaigns (Center for Countering Digital Hate, 2020). Up to a third of people in the UK have been exposed to anti-vaccine messages (Duffy, 2020). These and other factors might undermine a significant number of people’s intentions to seek or accept the offer of being vaccinated.

Vaccine Hesitancy

Vaccine hesitancy is more prevalent amongst particular groups or localities but the psychological mechanisms should be largely common to all. Understanding these therefore provides avenues for effective intervention. We propose that people’s levels of personal concern and political trust (i.e., in the authorities responsible for the vaccination campaign)

should have distinct roles in reducing vaccine hesitancy and that the absence of both should be especially likely to characterize those with vaccine hesitancy. We present two studies that test this contention; a large-scale survey that measured the vaccine hesitancy among over 8,500 respondents in Great Britain between December 2020 and February 2021, and a representative sample of over 1,000 British respondents in March 2021.

Concern

People are generally more willing to adopt protective behavior when they are more concerned about the situation at stake. This applies across a number of life domains including organisational (Rundmo & Hale, 2003), environmental (Rhead et al., 2015), and crucially, health behavior (Iversen & Rundmo, 2002). Prior to this pandemic, vaccination intentions have been shown to be higher as a function of both personal risk (i.e., self-concern) and worry about protecting vulnerable others (i.e., other-concern; Vietri et al., 2011). Although self-concern and other-concern are theoretically independent they can become strongly intertwined when people feel more strongly connected or psychologically ‘fused’ to wider social groups, such as in time of global crisis (Segal et al., 2018). In the context of the pandemic, we therefore expect those with greater concern about the consequences of the pandemic should be more willing to receive the COVID-19 vaccine. Crucially, however, people who feel less concerned might be less motivated to receive the vaccine, potentially jeopardising the collective endeavor to subdue the virus.

Political Trust

Regardless of their levels of concern, individuals may adopt protective behavior for other reasons – a key one of these being political trust. Political trust refers to the confidence people have in their government, and the extent to which they see their government as trustworthy and competent (Levi & Stoker, 2000). Importantly, political trust influences citizens’ behavior and, generally speaking, willingness to comply with rules and regulations

enacted by the authorities (Marien & Hooghe, 2011; Tyler, 2001, 2006). Several studies (see Devine et al., 2020) have shown that political trust is related to compliance with COVID-19 restrictions, but of relevance here is how trust combines with concern.

The potential influence of trust is particularly apparent when citizens do not perceive the regulation as directly benefiting their self-interest (Rudolph & Evans, 2005), in which case political trust may sustain compliance even when personal interest or concern is low. Put differently, when people's level of concern is low, political trust could mitigate low motivation to adopt protective behavior (see also Baum et al., 2009).

This reasoning suggests that while the presence of either political trust or concern is necessary, and either should be sufficient, to motivate vaccine uptake, the absence (or low levels) of both would substantially increase vaccine hesitancy.

The Distrustful Complacency Hypothesis

Recent theorizing on 'aversion amplification' (see Abrams & Travaglino, 2018) focused on the way political trust interacts with concern to affect political intentions. The central principle is that certain behaviors are particularly likely when political trust combines interactively with other motivators, such as anxiety or concern. Based on this reasoning, Lalot et al. (2021) advanced a 'distrustful complacency hypothesis.' This hypothesis was tested on small opportunity samples of respondents ($N = 400$) in France and Italy during lockdown in Spring 2020. As predicted, respondents' intentions to comply with governmental COVID-19 behavioral restrictions were significantly lower amongst those who had both lower levels of concern and lower political trust, than amongst those who had either higher concern (regardless of trust) or higher trust (regardless of concern). Although relevant to vaccine hesitancy, the relatively small sample sizes and the measurement of compliance intentions in necessarily general terms (i.e., "how much do you intend to respect any restrictions imposed

by the government?") limits the generalizability of these findings to vaccine hesitancy and its relevance a wider set of locations or groups.

If distrustful complacency is clearly linked to vaccine hesitancy this suggests that a coherent psychological strategy selectively targeting trust and concern may be particularly effective in reducing hesitancy. The present research therefore provides a much more comprehensive and urgently needed test of the distrustful complacency hypothesis. We (*a*) examine the UK context in which vaccines were just about to be offered widely, (*b*) employ much larger and more representative samples allowing for a comprehensive examination of demographic factors, and (*c*) focus on the more specific outcome of hesitancy to accept the COVID-19 vaccine.

Study 1

Method

Design and Hypotheses

This study took the form of a cross-sectional survey in which we measured concern about COVID-19, political trust, and vaccine hesitancy. We expected significant main effects of both concern and political trust: People with lower concern should report greater vaccine hesitancy and people with lower political trust should report greater vaccine hesitancy. More importantly, we also expected a significant interaction so that the combination of concern and trust also affects hesitancy. Specifically, we expected distinctively greater vaccine hesitancy when both trust and concern were at low levels (i.e., a state of distrustful complacency).

Data Collection

The present data were collected as part of a large-scale survey of social cohesion in the UK during COVID-19. The research project encompassed 13 different places in the UK, namely: the nation of Scotland, the nation of Wales, and in England the county of Kent, the metropolitan areas of Greater London, Greater Manchester, West of England Combined

Authority, and West Midlands Combined Authority, as well as six smaller local authorities whom councils were partnering with the research team (Blackburn with Darwen, Bradford, Calderdale, Peterborough, Walsall, and Waltham Forest). In addition, another sample was composed of community activists (currently volunteering for different charities) from across Great Britain. To enable assessment of hesitancy among two large ethnic minority groups these samples were boosted with Black respondents and Muslim respondents to achieve non-overlapping quotas of $n = 500$ each from across Britain. Sample size was determined prior to data collection based on feasibility and funding capacities (specifically, we aimed for a minimum $n = 2000$ for Greater London, $n = 1000$ for Greater Manchester and West Midlands Combined Authority, $n = 500$ for each of Scotland, Wales, Kent, and West of England Combined Authority, and $n = 200$ for each of the smaller local authorities). Data were collected between 4th December 2020 and 2nd February 2021 (to provide temporal context, a timeline of events is detailed in Supplementary Material).

Participants and Procedure

Respondents were recruited to complete an online survey through an online research panel service (Qualtrics Panels) and via social media and distribution through mailing lists by the partnering local councils. All respondents were remunerated for their participation (£5). A total of 8,743 respondents completed the survey, but participants who failed an attention check or completed the survey in an unreasonably short amount of time were automatically excluded from the sample ($n = 114$; i.e., 1.3% exclusion rate), leaving 8,629 complete questionnaires. They were 3,814 male and 4,762 female (53 undisclosed) ranging 18 to 91 years of age ($M = 47.74$, $SD = 16.57$). Most respondents self-described as White or White British (77.6%) with smaller numbers from Asian (8.8%), Black (6.6%) or Mixed (1.8%) ethnic background. All demographics are reported in Table 1. A sensitivity power analysis

revealed that the sample size was sufficient to detect a small interaction effect ($d = .08$) at 95% power ($\alpha = .05$).

Materials

Concern. Concern was measured with a single item, “Compared with other things, how concerned are you about the impact of coronavirus for the UK?” (1 = Not at all concerned, 5 = Extremely concerned; $M = 3.77$, $SD = 1.12$). Unless stated otherwise, all measures were assessed using 5-point Likert scales.

Political Trust. Five items measured political trust: general (e.g., “Most members of the UK Parliament are honest”) and specific to COVID-19 (e.g., “I believe the UK Government is handling the causes and consequences of the pandemic competently”, 1 = Strongly disagree, 5 = Strongly agree; see Abrams & Travaglino, 2018; Lalot et al., 2021). Items loaded on a single factor and were aggregated into one average score, showing acceptable reliability (Cronbach’s $\alpha = .73$, McDonald’s $\omega_T = .79$; $M = 2.70$, $SD = .77$). A zero-order correlation showed political trust and concern were only very weakly correlated, $r(8628) = .04$, $p < .001$.

Vaccination Hesitancy. One item assessed hesitancy, addressing personal intention to accept or refuse being vaccinated: “Imagine that the NHS [the UK National Health System] had plenty of supplies and contacted you next week to invite you to get vaccinated on a day of your choice in the next week. What would you decide?” (1 = I would refuse without hesitation, 5 = I would accept without hesitation; $M = 4.12$, $SD = 1.29$). Overall, 14.8% of respondents said they would refuse the vaccine, 10.0% were unsure, and 73.6% would accept it. This is very much in line with the results of other national surveys. For example, polls revealed that between 70% and 83% of UK respondents said they would take the vaccine (or had already received it) between 14 December 2020 and 29 January 2021 (YouGov, 2021).

Respondents could also indicate that they had already received the vaccine (134 respondents or 1.6% ticked this option); which we recoded for analyses as the highest positive intention.

Results

Analytical Strategy

Two strategies were implemented to account for potential differences between the different strata in the surveys and for effects of demographics. First, we conducted multilevel analyses with place as a random factor (nation, then county level; ICC = 0.011). We initially ran both the constrained intermediate model (CIM; random intercept only) and the augmented intermediate model (AIM; random intercept and slope) and compared them. The likelihood ratio test showed that the AIM did not significantly improve the fit of the model, as compared to the CIM, $\chi^2(df = 6) = 1.16, p = .98$. We hence kept the simpler CIM model for further analyses. Second, we included the main demographics as covariates in the statistical model. We tested the model in two steps, introducing first the main predictors (concern and trust, both standardized, and their interaction), then adding demographics as covariates (gender: -1 = male, 1 = female; ethnicity, coded as whether White: -1 = non-White, 1 = White; and age, socioeconomic status, and political orientation: all continuous and grand-mean centred).

Vaccine Hesitancy

We regressed vaccine hesitancy on those predictors. Results, reported in Table 2, indicated main effects of both concern and political trust, so that respondents with greater concern or greater political trust reported lower vaccine hesitancy. Of central interest, the expected concern $\times$ trust interaction was also significant and was unaffected by the introduction of covariates in the second step of the model (Figure 1).

Decomposition of simple effects revealed that, amongst respondents with higher levels of concern (+1 *SD*), vaccine hesitancy was low regardless of their level of political trust, although it was still lower amongst respondents with higher political trust, $b = .11, SE = .017$,

$t(8202) = 6.56, p < .001$. Amongst respondents with lower concern ($-1 SD$), vaccine hesitancy strongly increased when they also had lower levels of political trust, $b = .34, SE = .018, t(8193) = 18.94, p < .001$. Put differently, amongst respondents who felt more distrustful ($-1 SD$), there was a strong link between concern and vaccine hesitancy, $b = .37, SE = .016, t(8197) = 22.89, p < .001$, whereas this was reduced by half amongst respondents who felt more trustful ($+1 SD$), $b = .14, SE = .018, t(8199) = 7.82, p < .001$. These results are consistent with our hypothesis that either high concern or high trust should be sufficient to induce lower vaccine hesitancy, but that hesitancy would be significantly greater if both concern and trust were low. Respondents with both low trust and low concern were 22% more vaccine hesitant than respondents with either high trust or high concern, and 29% more hesitant than respondents with both high trust and high concern.

Average vaccine hesitancy did not differ significantly between the different samples. The inclusion of demographic covariates in the second step of the model revealed that vaccine hesitancy was significantly lower amongst males, White people, older people, and wealthier people, as well as amongst those describing themselves as politically more left-wing. The entire set of demographics explained an additional 10% of variance, where political trust and concern (and their interaction) had explained 12%.

Exploratory Analyses: An Effect of Ethnicity?

A growing concern in the UK is the apparent reluctance of people from minority ethnic background to accept the COVID-19 vaccine. As of February 2021, NHS England data revealed that White people were twice as likely to have received the vaccine than Black people, in the 80+ age-group (Parveen & Barr, 2021). It has been argued that vaccine hesitancy within these communities could be due to targeted misleading claims such as the vaccine containing alcohol or pork (Humphreys et al., 2021) or “human guinea pigs” claims (Etutu & Goodman, 2021). The present data also reveal that non-White respondents expressed

greater vaccine hesitancy than White respondents. The central question then arises of whether ethnicity in any way changes the roles of political trust and concern in vaccine hesitancy? If the underlying psychological processes are the same, then ethnicity should not moderate the interactive effect of trust and concern on hesitancy.

To test this, we conducted an additional multilevel linear regression analysis, still controlling for ethnicity, age, gender, socioeconomic status, and political orientation, and adding the two-way and three-way interaction terms between ethnicity, political trust, and concern. This analysis was exploratory in nature and we did not hypothesize a moderating effect of ethnicity. Results showed that the two-way political trust $\times$ concern remained significant despite the introduction of other interaction terms, $b = -.11$, $SE = .015$, $t(8185) = -7.11$, $p < .001$, and ethnicity did not qualify the two-way interaction; political trust $\times$ concern $\times$ ethnicity: $b = -.02$, $SE = .015$, $t(8184) = -0.12$, $p = .91$. Similar results arose when considering Black versus non-Black respondents (instead of White vs. non-White respondents): there was a significant main effect of ethnicity showing greater vaccine hesitancy amongst Black respondents, $b = -.40$, $SE = .026$, $t(7995) = -15.42$, $p < .001$. Most importantly however, results showed again the two-way political trust $\times$ concern interaction despite the introduction of other interaction terms, $b = -.09$, $SE = .025$, $t(8194) = -3.68$, $p < .001$, and Black ethnicity did not qualify the two-way interaction; political trust $\times$ concern $\times$ ethnicity: $b = .02$, $SE = .025$, $t(8193) = 0.94$, $p = .35$. Finally, considering minority religious affiliation (i.e., Muslim faith versus other religions) produced very similar results again. There was a significant main effect of faith showing greater vaccine hesitancy amongst Muslim respondents, $b = -.19$, $SE = .027$, $t(7658) = -7.15$, $p < .001$. However, the two-way political trust $\times$ concern interaction remained significant despite the introduction of other interaction terms, $b = -.10$, $SE = .023$, $t(8125) = -4.32$, $p < .001$, and religion did not qualify the two-way interaction; political trust $\times$ concern $\times$ religion: $b = .01$, $SE = .023$, $t(8124) = 0.52$, $p = .61$. In

other words, despite a difference in the absolute level of hesitancy between majority and minority ethnic respondents, the psychological mechanisms underlying vaccine intentions are the same across these different ethno-religious characteristics.

Study 2

The first study showed clear evidence of a distrustful complacency effect, through which participants with both low concern and low political trust reported markedly higher vaccine hesitancy than participants with either high concern, high trust, or both. Despite the large sample size and robustness of the results to the inclusion of different demographics, the study relied on single-item measures for both concern and vaccine hesitancy (operationalized only as intention). To address this possible measurement limitation we conducted a second study, serving as a conceptual replication of Study 1, that employed multi-item constructs for all of political trust, concern of COVID-19, and vaccine hesitancy. Study 2 was conducted in March 2021 (see continued timeline in Supplementary Material). The study design, measures, and sample size were preregistered: <https://aspredicted.org/blind.php?x=mi3wi9>. As described in the preregistration, other measures of compliance with COVID-19 restrictions were included in the study, but they will not be discussed in the present paper.

Method

Participants and Procedure

Respondents were recruited through the online platform Prolific Academic, specifying a representative sample of approximately 1,000 British respondents. We slightly oversampled to ensure that the final N would match this targeted sample size. A total of 1,074 respondents completed the survey. Eight participants who failed an attention check or completed the survey in an unreasonably short amount of time were excluded from the sample (0.7% exclusion rate), leaving 1,066 complete questionnaires. Sample characteristics were 520 male and 542 female (4 undisclosed) ranging 18 to 83 years of age ($M = 46.94$, $SD = 15.57$). Most

respondents self-described as White or White British (85.0%) with smaller numbers from Asian (7.7%), Black (3.6%) or Mixed (1.9%) ethnic background. All demographics are reported in Table 3. A sensitivity power analysis revealed that the sample size was sufficient to detect a small interaction effect ($d = .22$) at 95% power ($\alpha = .05$).

Materials

Concern. Three items assessed concern about the pandemic, both for the individual and their larger group (see Lalot et al., 2021): “How concerned are you about consequences of the pandemic: for you personally (such as your health, financial or other aspects); for the people in your local area; for the people in the UK in general?” (1 = Not concerned at all, 7 = Extremely concerned). Items loaded on a single factor and were aggregated into one average score, showing good reliability (Cronbach’s $\alpha = .83$, McDonald’s $\omega_T = .85$; $M = 4.70$, $SD = 1.27$).

Political trust. Seven items measured political trust: general (e.g., “Most members of the UK Parliament are honest”), specific to COVID-19 (e.g., “I believe the UK Government is handling the causes and consequences of the pandemic competently”), and relative to Prime Minister Boris Johnson (e.g., “Over the next year, how much do you think Boris Johnson can be trusted to handle the pandemic for the UK as a whole?”, 1 = Strongly disagree, 5 = Strongly agree). Items loaded on a single factor and were aggregated into one average score, showing good reliability (Cronbach’s $\alpha = .92$, McDonald’s $\omega_T = .95$; $M = 2.46$, $SD = 0.94$). A zero-order correlation showed no significant relation between political trust and concern, $r(1065) = -.04$, $p = .15$.

Vaccine hesitancy. Two items measured vaccine hesitancy. The first item assessed intentions to accept or refuse the vaccine, just as in Study 1. A second item assessed a more general sense of confidence in the safety of the new vaccines: “How much do you trust that UK health authority would only approve a new vaccine for distribution to the general public

after proper tests ensuring the new vaccine is safe?” (1 = Do not trust at all, 5 = Trust completely). Both were aggregated into a single score of vaccine hesitancy with higher scores representing higher acceptance of the vaccine (Cronbach’s $\alpha = .78$, McDonald’s $\omega_T = .78$; $M = 4.26$, $SD = 0.91$).

Results

Measurement

We first conducted a factor analysis to ensure that the different items used were indeed measuring separate constructs. All items (3 concern, 7 political trust, and 2 vaccine hesitancy items) were entered in an exploratory factor analysis (extraction based on Eigenvalues, with Oblimin rotation), which revealed three factors accounting for 74% of variance. All loadings on the distinct factors were greater than .81 at the exception of two trust items with loadings of .41 and .51, respectively, and all items loaded on the expected factor. No cross-loading exceeded .35.

Vaccine Hesitancy

As in Study 1, we regressed vaccine hesitancy on political trust and concern (both standardized), and their interaction, and controlled for relevant demographics (age, gender, ethnicity, socioeconomic status, and political orientation). We relied again on multilevel modelling (county/nation) to account for the geographical dispersion of participants across Great Britain (see Table 4). Consistent with the results of Study 1, the model yielded main effects of both concern and political trust, so that respondents with greater concern or greater political trust reported less vaccine hesitancy. More importantly, the expected concern $\times$ trust interaction was also significant and was unaffected by the introduction of covariates in the second step of the model (Figure 2).

Decomposition of simple effects revealed that, amongst respondents with higher levels of concern (+1 SD), vaccine hesitancy was low regardless of their level of political trust,

although it was still lower amongst respondents with higher political trust, $b = .27$, $SE = .036$, $t(1047) = 7.54$, $p < .001$. Amongst respondents with lower concern (-1 SD), vaccine hesitancy strongly increased when they also had lower levels of political trust, $b = .43$, $SE = .038$, $t(1048) = 11.20$, $p < .001$. Put differently, amongst respondents who felt more distrustful (-1 SD), there was a strong link between concern and vaccine hesitancy, $b = .19$, $SE = .034$, $t(1046) = 5.75$, $p < .001$, which disappeared amongst respondents who felt more trustful ($+1$ SD), $b = .04$, $SE = .034$, $t(1046) = 1.24$, $p = .21$. These results again supported our hypothesis that either high concern or high trust should be sufficient to induce higher vaccination acceptance, but that hesitancy would be significantly greater if both concern and trust were low. Respondents with both low trust and low concern were 10% more vaccine hesitant than respondents with high concern, 18% more than respondents with high trust, and 20% more hesitant than respondents with both high trust and high concern.

The inclusion of demographic covariates in the second step of the model revealed that vaccine hesitancy was significantly lower amongst White respondents and those with higher socioeconomic status, as well as amongst those describing themselves as politically more left-wing. Very consistent with the first study, the set of demographics explained an additional 9% of variance, where political trust and concern (and their interaction) had explained 11%.

Finally, it can be noted that analyses conducted on each item of vaccine hesitancy separately yielded very consistent results, the concern $\times$ trust interaction being significant in both instances.

Discussion

After a year of the global COVID-19 pandemic, widespread vaccination offers the fastest route for suppressing the virus and for societal recovery. Vaccination levels remain low in many countries and vaccine hesitancy is a persistent challenge. Thus, it is crucial to understand the psychological mechanisms and profiles associated with vaccine hesitancy. We

hypothesized that concern and political trust are two routes that can interactively affect vaccine hesitancy. Specifically, while either concern or political trust should be sufficient for vaccine acceptance the absence of both (*distrustful complacency*) would result in vaccine hesitancy.

This hypothesis was supported in both studies. Study 1 involved over 8000 people in 13 different parts of the UK (effectively 13 replications). Study 2, reinforced the finding two months later with a UK representative sample, even though a much larger proportion of the UK population had been vaccinated. Respondents low in both trust and concern were between 10% and 22% more hesitant about the vaccine than respondents with either high trust or high concern, and 20% to 29% more hesitant than respondents with both high trust and high concern. Some people will accept the vaccine because they are highly concerned about the consequences of the pandemic (for themselves and for others). Others will do so because they trust the political institutions responsible for enacting the vaccination programme. However, those who, for whatever reasons, do not trust these institutions and are also not concerned about the virus are much likelier to be hesitant about vaccination.

Vaccine hesitancy was lower higher amongst males, left-wing oriented, older, and wealthier respondents, and amongst White respondents (for similar findings, see e.g., Schwarzsinger et al., 2021). Media and practical attention has been paid to higher levels of vaccine hesitancy amongst particular ethnic categories, perhaps due to the spread of misleading information amongst them (Etutu & Goodman, 2021). However, we find that psychological variables explained at least as much variance as the demographic factors. Moreover, the interactive relationship between concern and trust and hesitancy beyond these demographics, showed that the same psychological process, distrustful complacency, is equally relevant regardless of differences in locality, and similarly amongst White, Black, and Muslim respondents. Importantly, unlike demographics, concern and trust are subject to

external influence and could hence be targeted in policies and persuasion campaigns aiming to tackle vaccine hesitancy.

The strengths of the present research include the large sample sizes in both studies, and the ability to examine both place-based and demographic factors, as well as the timely windows of data collection. The inclusion of sufficiently large numbers of both Black and Muslim respondents enabled us to properly distinguish demographic and psychological factors in their vaccine hesitancy. This important point allows enhances our confidence that the results are generalisable across different ethnic categories and across different sized communities and different countries within the UK. Levels of concern and trust do differ by location. For example, trust in the UK government is notably lower within Scotland than within England (McDonnell, 2020b), and levels of concern might differ locally depending on local infection rates; but the key point is that these contextual differences do not qualify the role of trust and concern as key motivators in vaccine hesitancy.

Although we cannot be sure of generalizability to other national contexts, nothing in the present evidence suggests that demographic differences would qualify the conclusions, and taken together with Lalot and colleagues' (2021) evidence from France and Italy (where vaccines have currently reached a minority of the population), we have some confidence that these findings have much wider generality. Nonetheless, further work would help to establish this conclusion more firmly. Study 2 also addressed potential measurement limitations in Study 1 although further work could examine elements of trust and concern in more detail. For example, self-concern and concern for others are usually closely related but could constitute slightly different routes to compliance (Vietri et al., 2011). Likewise, it may also be useful to examine different aspects of trust (e.g., in the government in general, in leadership, in the health institutions) and whether different people or groups anchor their trust in different sources.

This research has clear implications for policy and vaccination campaigns globally. Higher political trust and concern about the pandemic are two factors that can independently motivate positive vaccination intentions, whereas the lack of both is associated with substantially greater hesitancy – a distrustful complacency effect. This suggests at least two ways to address vaccine hesitancy.

Lack of concern may become a growing problem if the unvaccinated become less concerned once a larger proportion of the population has already been vaccinated. But strategies to raise levels of concern raise both practical and ethical complexities and requires care and targeting specifically at those who feel low concern. There is a risk that invoking even greater concern amongst those who might already be sufficiently concerned could backfire, leading to reactance, denial or disengagement if the person feels unable to cope (Witte & Allen, 2000). Fear appeals need to be combined with an adequate perception of efficacy – a balance that can be difficult to achieve in persuasion and information campaigns (Ruiter et al., 2014).

The alternative option is to try to increase political trust but this may be quite volatile. Political trust typically increases at the onset of crises as citizens turn to their leadership for guidance in uncertain times (Hunt et al., 1999). Trust can easily be lost if government action fails to meet citizens' expectations. Unethical or rule-breaking behavior by political leadership can also severely damage political trust (Abrams et al., 2014), as perhaps illustrated by the “Dominic Cummings affair” in the UK (Fancourt et al., 2020). Despite such episodes however, trust resides at multiple levels (e.g., national, regional, local) and in principle, the presence of a relevant authority that guides by example and maintains a clear and consistent line of communication is more likely to be perceived as efficient and trustworthy (Abrams et al., 2021), hence ultimately encouraging compliance with different rules and regulations on the longer run – and reducing vaccine hesitancy.

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Tables

Table 1. *Study 1: Demographics of the sample (breakdown by nation and combined authority).*

	GLA		WECA		WMCA		Greater Manchester	
Demographic categories	Frequ.	%	Frequ.	%	Frequ.	%	Frequ.	%
<i>Gender</i>								
Male	1186	46.3	234	45.2	577	44.3	499	46.9
Female	1365	53.3	282	54.4	719	55.2	560	52.6
Undisclosed	11	0.4	2	0.4	6	0.5	5	0.5
<i>Age</i>								
18-24	142	5.5	36	6.9	102	7.8	61	5.7
25-34	355	13.9	56	10.8	156	12.0	144	13.5
35-44	429	16.7	88	17.0	230	17.7	181	17.0
45-54	508	19.8	96	18.5	246	18.9	216	20.3
55-64	551	21.5	114	22.0	287	22.0	200	18.8
65-74	439	17.1	95	18.3	213	16.4	222	20.9
75+	138	5.4	33	6.4	68	5.2	40	3.8
<i>Ethnicity</i>								
White / White British	1878	73.3	478	92.3	1010	77.6	943	88.6
Asian / Asian British	283	11.0	13	2.5	149	11.4	56	5.3
Black / African / Caribbean / Black British	235	9.2	12	2.3	73	5.6	28	2.6
Mixed / Multiple ethnicity	62	2.4	8	1.5	25	1.9	17	1.6
Other ethnicity	44	1.7	4	0.8	11	0.8	6	0.6
Undisclosed	60	2.3	3	0.6	34	2.6	14	1.3
<i>Socioeconomic status</i>								
8-rung Status ladder: <i>M (SD)</i>	4.61 (1.32)		4.51 (1.22)		4.25 (1.37)		4.31 (1.25)	
<i>Political orientation</i>								
Left-wing	1067	41.6	184	35.5	366	28.1	405	38.1
Centre	810	31.6	166	32.0	525	40.3	369	34.7
Right-wing	681	26.6	166	32.0	408	31.3	288	27.1
Undisclosed	4	0.2	2	0.4	3	0.2	2	0.2
Total	2562	100	518	100	1302	100	1064	100

Note. GLA: Greater London Area, WECA: West of England Combined Authority, WMCA: West Midlands Combined Authority.

Continued on next page...

<i>...continued</i>	Kent		Other English		Scotland		Wales	
Demographic categories	Frequ.	%	Frequ.	%	Frequ.	%	Frequ.	%
<i>Gender</i>								
Male	223	40.6	598	38.4	271	50.7	226	41.8
Female	323	58.8	944	60.6	261	48.8	308	56.9
Undisclosed	3	0.5	16	1.0	3	0.6	7	1.3
<i>Age</i>								
18-24	72	13.1	216	13.9	52	9.7	87	16.1
25-34	123	22.4	378	24.3	138	25.8	136	25.1
35-44	87	15.8	323	20.7	139	26.0	94	17.4
45-54	95	17.3	209	13.4	86	16.1	82	15.2
55-64	76	13.8	231	14.8	62	11.6	81	15.0
65-74	73	13.3	161	10.3	46	8.6	43	7.9
75+	23	4.2	40	2.6	12	2.2	18	3.3
<i>Ethnicity</i>								
White / White British	436	79.4	1051	67.5	448	83.7	455	84.1
Asian / Asian British	16	2.9	211	13.5	18	3.4	13	2.4
Black / African / Caribbean / Black British	21	3.8	179	11.5	13	2.4	5	0.9
Mixed / Multiple ethnicity	9	1.6	19	1.2	4	0.7	12	2.2
Other ethnicity	2	0.4	24	1.5	4	0.7	3	0.6
Undisclosed	65	11.8	74	4.7	48	9.0	53	9.8
<i>Socioeconomic status</i>								
8-rung Status ladder: <i>M (SD)</i>	4.37 (1.21)		4.36 (1.31)		4.33 (1.21)		4.18 (1.20)	
<i>Political orientation</i>								
Left-wing	243	44.3	709	45.5	281	52.5	284	52.5
Centre	162	29.5	528	33.9	166	31.0	161	29.8
Right-wing	144	26.2	317	20.3	86	16.1	95	17.6
Undisclosed	0	0	4	0.3	2	0.4	1	0.2
Total	549	100	1558	100	535	100	541	100

Notes. Subjective socioeconomic status is measured on a 'status ladder' with 8 rungs numbered 1 to 8 (a higher number represents higher status). Political orientation is measured on a 7-point scale (1 = Left-wing, 4 = Centre, 7 = Right wing). For the table breakout we considered 1-3 as left-wing, 4 as centre, 5-7 as right-wing. In the analyses, however, the variable is kept continuous.

Table 2. *Study 1: Summary of the analyses predicting vaccination hesitancy (Hierarchical multilevel linear regression model).*

	Step 1				Step 2			
	<i>b</i> (<i>SE</i>)	95% CI	<i>t</i> -test	<i>p</i> -value	<i>b</i> (<i>SE</i>)	95% CI	<i>t</i> -test	<i>p</i> -value
<i>Constant</i>	4.09 (.035)	[4.02, 4.16]	116.36	< .001	3.96 (.029)	[3.90, 4.02]	135.69	< .001
Concern	0.26 (.013)	[0.23, 0.28]	19.83	< .001	0.26 (.013)	[.23, .28]	20.16	< .001
Political trust	0.31 (.013)	[0.28, 0.33]	23.87	< .001	0.23 (.013)	[.20, .25]	17.15	< .001
Concern × trust	-0.12 (.012)	[-0.15, -0.10]	-10.06	< .001	-0.11 (.012)	[-.14, -.09]	-9.56	< .001
Gender					-0.13 (.013)	[-.15, -.10]	-10.18	< .001
Age					0.21 (.014)	[.18, .24]	14.72	< .001
Ethnicity					0.27 (.017)	[.24, .31]	15.88	< .001
Socioeconomic status					0.11 (.013)	[.09, .14]	8.67	< .001
Political orientation					-0.11 (.012)	[-.16, -.10]	-9.56	< .001

Note. More positive coefficients indicate less vaccine hesitancy. Random effects are estimated for 101 counties (Level 2) embedded within the 3 nations of England, Scotland, and Wales (Level 3).

Step 1: $R^2_{\text{adj Level 1}} = .118$. Step 2: $R^2_{\text{adj Level 1}} = .224$.

Table 3. *Study 2: Demographics of the sample.*

Overall representative sample	
Demographic categories	Frequ. %
<i>Gender</i>	
Male	520 48.8
Female	542 50.8
Undisclosed	4 0.4
<i>Age</i>	
18-24	74 6.9
25-34	230 21.6
35-44	189 17.7
45-54	177 16.6
55-64	248 23.3
65-74	128 12.0
75+	20 1.9
<i>Ethnicity</i>	
White / White British	906 85.0
Asian / Asian British	82 7.7
Black / African / Caribbean / Black British	38 3.6
Mixed / Multiple ethnicity	20 1.9
Other ethnicity	15 1.4
Undisclosed	5 0.5
<i>Socioeconomic status</i>	
8-rung Status ladder: <i>M</i> (<i>SD</i>)	4.62 (1.18)
<i>Political orientation</i>	
Left-wing	483 45.3
Centre	312 29.3
Right-wing	271 25.4
Total	1066 100

Notes. Subjective socioeconomic status is measured on a 'status ladder' with 8 rungs numbered 1 to 8 (a higher number represents higher status). Political orientation is measured on a 7-point scale (1 = Left-wing, 4 = Centre, 7 = Right wing). For the table breakout we considered 1-3 as left-wing, 4 as centre, 5-7 as right-wing. In the analyses, however, the variable is kept continuous.

Table 4. *Study 2: Summary of the analyses predicting vaccine hesitancy (Hierarchical multilevel linear regression model).*

	Step 1				Step 2			
	<i>b</i> (<i>SE</i>)	95% CI	<i>t</i> -test	<i>p</i> -value	<i>b</i> (<i>SE</i>)	95% CI	<i>t</i> -test	<i>p</i> -value
<i>Constant</i>	4.27 (.030)	[4.21, 4.33]	143.93	< .001	4.11 (.036)	[4.04, 4.18]	113.50	< .001
Concern	0.11 (.026)	[0.06, 0.16]	4.19	< .001	0.12 (.025)	[0.07, 0.17]	4.65	< .001
Political trust	0.27 (.026)	[0.22, 0.32]	10.17	< .001	0.35 (.030)	[0.29, 0.41]	11.84	< .001
Concern × trust	-0.08 (.024)	[-0.12, -0.03]	-3.22	.001	-0.08 (.023)	[-0.12, -0.03]	-3.35	< .001
Gender					-0.05 (.025)	[-0.10, 0.004]	-1.80	.072
Age					0.05 (.027)	[-0.01, 0.10]	1.76	.079
Ethnicity					0.22 (.037)	[0.15, 0.29]	6.03	< .001
Socioeconomic status					0.15 (.025)	[0.10, 0.20]	5.83	< .001
Political orientation					-0.21 (.030)	[-0.27, -0.15]	-7.04	< .001

Note. More positive coefficients indicate less vaccine hesitancy. Random effects are estimated for 95 counties (Level 2) embedded within the 3 nations of England, Scotland, and Wales (Level 3).

Step 1: $R^2_{\text{adj Level 1}} = .105$. Step 2: $R^2_{\text{adj Level 1}} = .197$.

Figures

Figure 1. *Study 1: Vaccine hesitancy as a function of concern and political trust (low scores represent greater hesitancy).*

Figure 2. *Study 2: Vaccine hesitancy as a function of concern and political trust (low scores represent greater hesitancy).*